

AI AUTOMOTIVE INDUSTRIES

AUTOMOTIVE and AVIATION MANUFACTURING
ENGINEERING • PRODUCTION • MANAGEMENT

DECEMBER 15, 1954

In This Issue

Highlights of Mexican 1900-Mile Race
Free Piston-Gas Turbine Developments
Fluid Coupling for Testing Small Engines
Automated Machines in Ball Bearing Plant
Current Production Processes without Chips
Mammoth Milling Machine for Aircraft Parts

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A C H I L T O N P U B L I C A T I O N



5½ BILLION HORSEPOWER ON THE GO!

... your share is a little more dependable,
more responsive, because of Heald
precision-finished parts like this

Yours is among the more than 45 million passenger cars representing some 5½ billion horsepower in use today—a real tribute to the automotive industry and the precision mass production that has made it possible. There are many Heald machines in this production picture, precision finishing hundreds of different parts. The one shown here is a typical example.

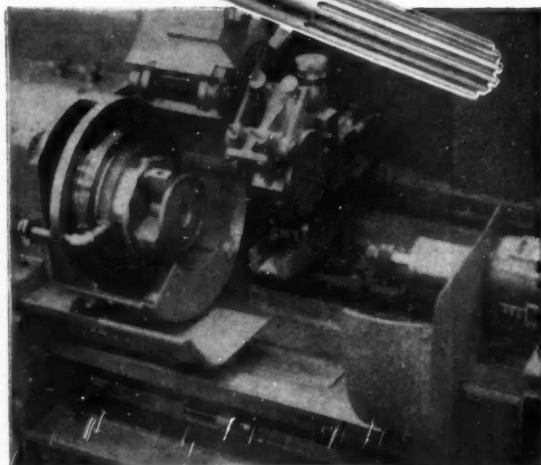
Applied to any job, Heald precision means time and money saved—a finer, longer-lasting product that can stay ahead in the competitive race. That's why IT PAYS TO COME TO HEALD.



THE HEALD MACHINE COMPANY

WORCESTER 6, MASSACHUSETTS

Chicago • Cleveland • Dayton • Detroit • Indianapolis • New York

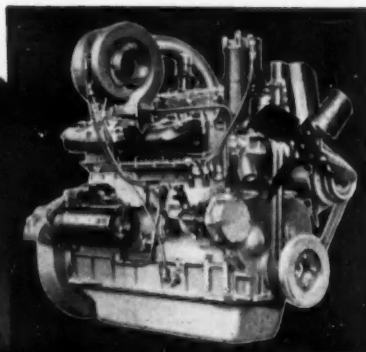
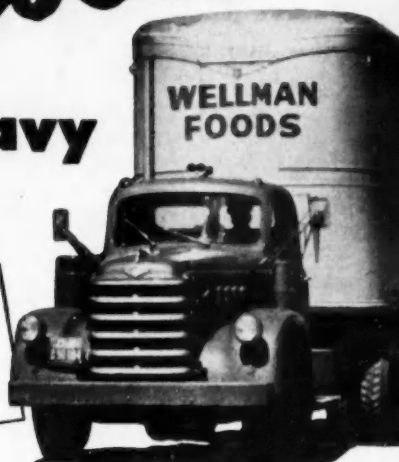


The model 271 Size-Matic Internal above precision grinds two different I.D.'s simultaneously in automatic transmission output shafts. Wheel-head spindle carries two wheels of different diameters. Air-operated diaphragm chuck simplifies loading. Entire operating cycle—rough grind, dress, finish grind, size and retract—is fully automatic. Constant feed throttling maintains consistent feed rates regardless of internal or external temperature changes.

WAUKESHA *Diesels*

**for fast, heavy
hauls...**

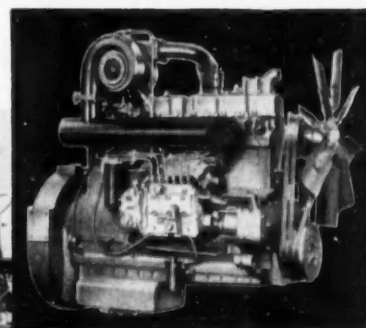
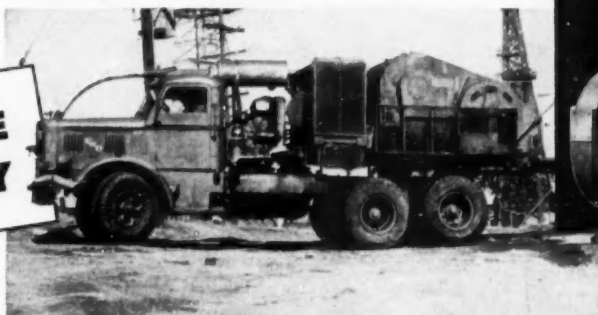
**CROSS
COUNTRY**



135-DKB Series DIESELS
Turbocharged (shown) or Normal
426 cu. in.; 100 to 187 hp.

... where the pay-off is on payload—you'll make more miles and cut costs, too, with these modern feature-packed truckers' engines—Waukesha 135 Series Diesels.

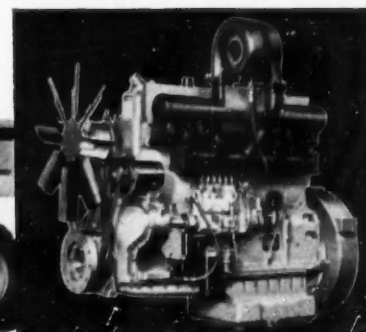
**OFF THE
HIGHWAY**



148-DKB Series DIESELS
Turbocharged (shown) or Normal
779 cu. in.; 170 to 280 hp.

... in and out... down and up... over and through... go the trucks with Waukeshas—148 Series Diesels putting out the power that pulls and pays.

**EXTRA
HEAVY-DUTY**



WAKDB Series DIESELS
Turbocharged (shown) or Normal
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... those tremendous, crushing
30-ton, 35-ton, 40-ton loads

... up stiff grades, without faltering or breakdown
... day after day—with Waukesha WAKDB Series Diesels.

Send for Bulletins

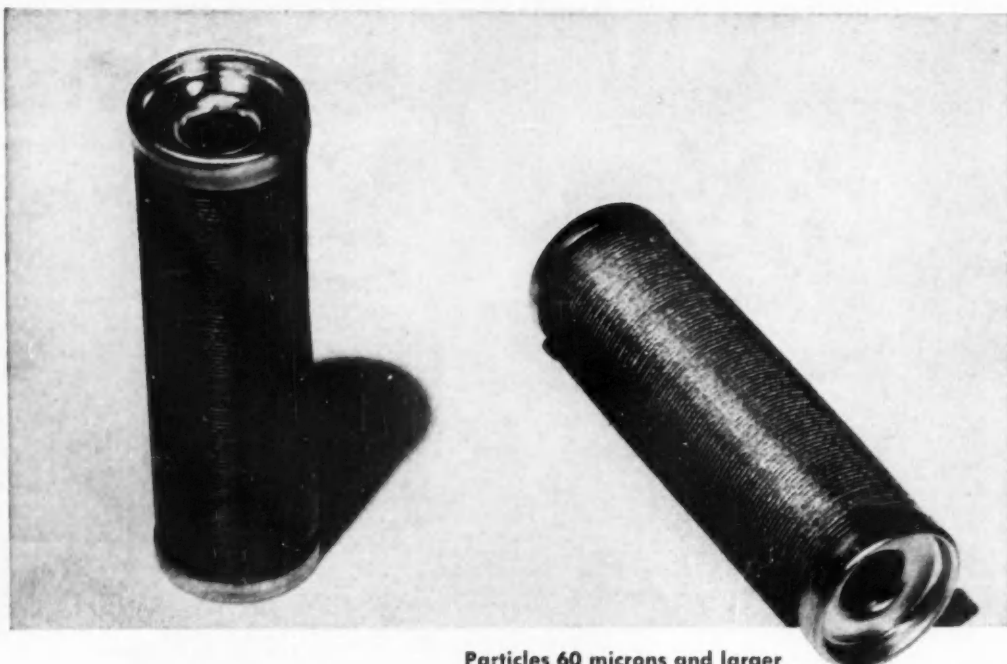
WAUKESHA MOTOR COMPANY, WAUKESHA, WIS.

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Los Angeles

262



Particles 60 microns and larger are kept from reaching carburetors or clogging fuel lines by this new filter. It's made by the Michigan Wire Cloth Company. Made economically of strong, durable Monel wire.

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for a major low-priced '55 car

For '55 one of America's largest selling cars will have a high quality wire cloth filter at the tank end of fuel lines. It's a first in the low-priced field!

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Then, Michigan Wire Cloth Company suggested Monel, which has been used successfully for years in marine gasoline tanks. Michigan was sure it would do this job, too.

And they had another reason for

suggesting Monel. Monel is so ductile that it can be drawn to fine wire sizes and woven at minimum cost. When used in these particular filters it cost the manufacturer no more than cheaper material.

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Wire Cloth of Monel is easily resistance-welded into fuel filter cylinder. This factor speeds production, lowers costs.

not find out... write for our technical bulletin, *Engineering Properties of Monel*.

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A CHILTON MAGAZINE

PUBLISHED SEMI-MONTHLY

AI**AUTOMOTIVE INDUSTRIES**

DECEMBER 15, 1954

VOL. III, NO. 12

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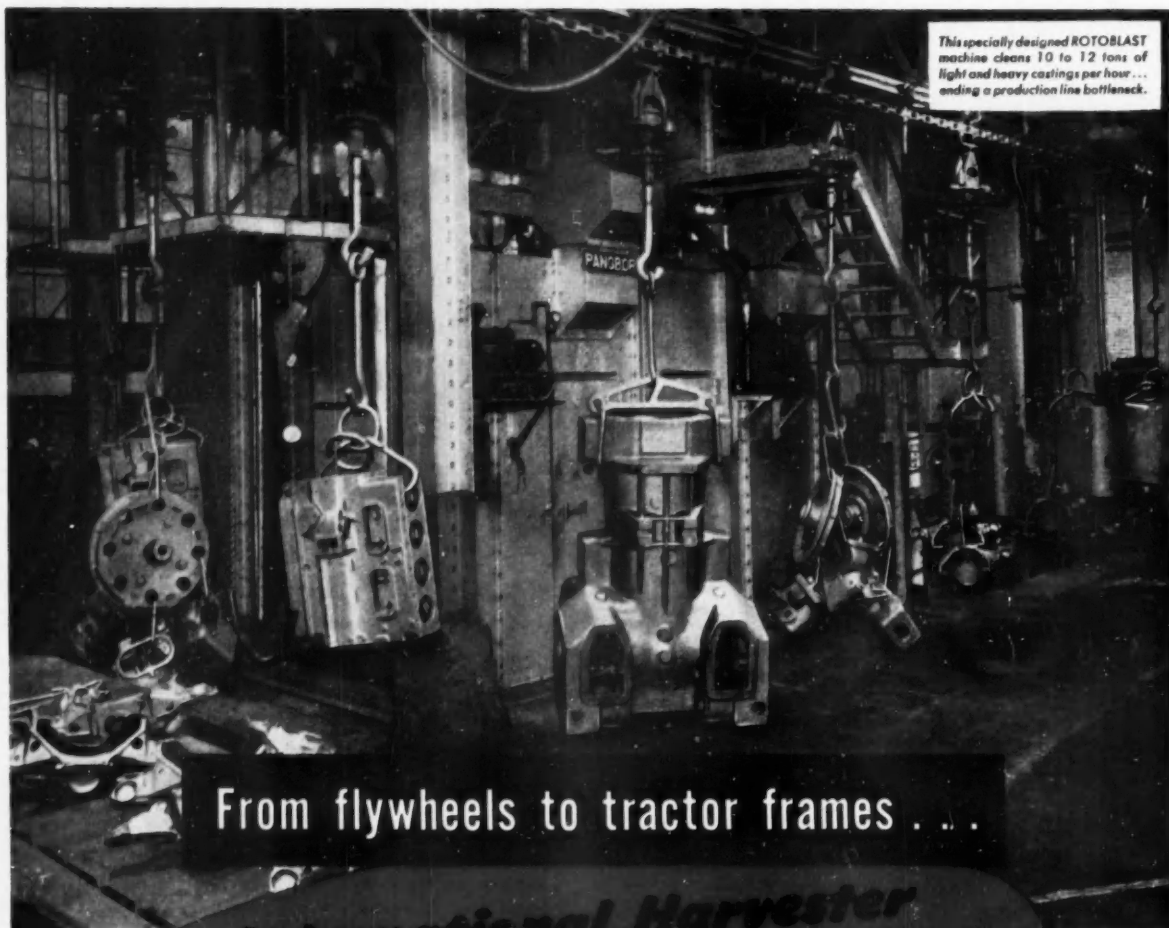
NBPNational Business
Publications, Inc.Audit Bureau
of Circulations

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"Locate" a Shaft?

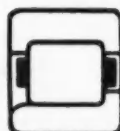
**HERE'S
HOW
HYATTS
HELP...**

3

TYPES



BU-L
separable
outer race
series



R-WB
separable
inner race
series



R-YS
separable
inner race
series

Shown in section at the left are three Hyatt Hy-Load Bearing types that are used for axial shaft location. Flanges on inner or outer races limit axial shaft movement and permit the bearing to take light, intermittent thrust loads.

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Hy-Loads are available in three diameter series, two widths and a complete range of sizes. For complete information write for Catalog 150—Hyatt Bearings Division, General Motors Corporation, Harrison, New Jersey.

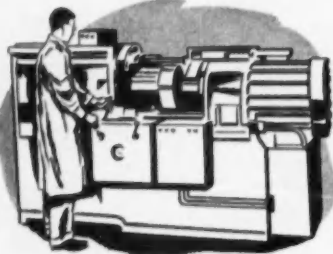
HYATT

ROLLER BEARINGS

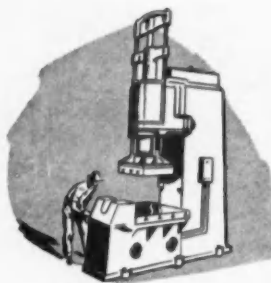
STRAIGHT 

BARREL 

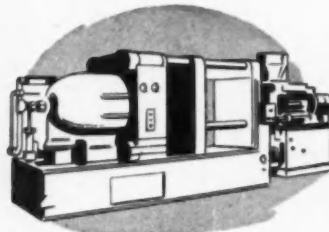
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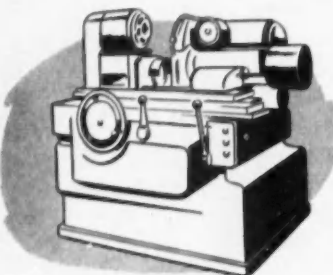
For hydraulic systems on all types of injection molding machinery.



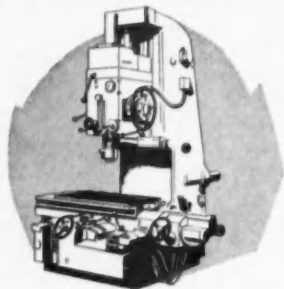
For hydraulic systems on all types of presses and forging hammers.



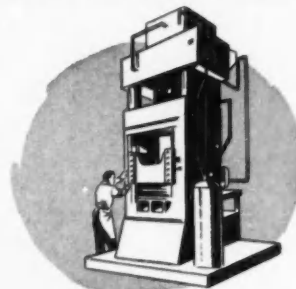
For hydraulic systems on all types of plastics molding equipment.



For hydraulic systems on grinding machines and other production tools.



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For hydraulic systems on standard and special heavy-duty forming presses.

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Patent 2172325—Sept. 5, 1939
Patent 2233902—Mar. 4, 1941

Superior bonding of Victor silicones to metal channel permits a strong, one-piece, leakproof construction. Internal lip retains lubricant; external lip excludes foreign matter. Valley in between the sealing lips is pre-lubricated for minimum friction. Cartridge-type flange allows ready removal of seal from housing without damage.



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Patent No. 2,140,710

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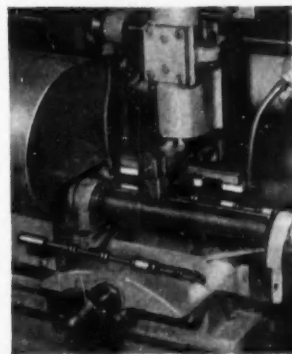
... and GISHOLT SUPERFINISH breaks another cost barrier!

Do you think of SUPERFINISH as an expensive process? Then it's high time you know the facts.

Here's an excellent case in point... on the record-breaking Douglas "Skyray." Among the most precise parts on this supersonic jet are the slide valves. They're ground from the solid, first on a cylindrical grinder, then on a centerless grinder. Then they're transferred to a Gisholt Superfinisher where the bearing sur-

faces get a finish of 3 micro-inches, r.m.s. Former time for hand-lapping ran from 2½ to 3 hours per piece. The Gisholt SUPERFINISHER does it in 45 seconds! Think of it: less than 1/200th of the time! And think what that does to costs!

If SUPERFINISH can improve your product, as probably it can, better get the facts. The complete story is in the booklet "Wear and Surface Finish." Ask us for your copy.



Approximate diam. of slide valves (lower left) is ½" with reduced diam. of ¼" between collars, or bearing surfaces. Parts are handled in the Gisholt Superfinisher in only 45 seconds per piece.

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represents the collective experience of specialists in the machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.



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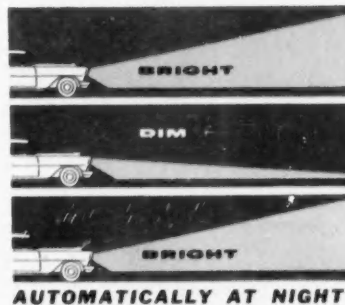
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For full particulars please consult your Cone Representative or inquire direct.



MATERIAL—EVERDURE: (96% copper, 3% silicon, 1% manganese) Hole drilled with 17/32" drill to 1½" depth; thread rolling of ½" pipe thread.

	HSS	CARBIDE
Cycle Time	35 secs.	15 secs.
Work Spindle Speed	420 R.P.M. at 124 S.F.	850 R.P.M. at 250 S.F.
Tool Wear	2000 pcs. per grind	5000 pcs. per grind



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- a process* that accurately generates cylindrical and flat surfaces at minimum cost . . .
- the services of an engineering staff experienced in working with processing men to design equipment that will give you the degree of automation best-suited to your conditions.

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▲ Long-stroke horizontal machine—equipped to automatically hold size.

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With STRESSPROOF, you simply machine the part you need, then install it. That's all . . . no heat treating, no straightening, no carburizing! You're back in operation in hours, not days.

And there's no need to worry about *what* steel to use . . . the qualities you need are built-in. STRESSPROOF is *as strong* as heat-treated steels of equal hardness; *wears better* than many heat-treated carbon

or alloy steels; and *machines easily* . . . 50% to 100% faster than carbon or alloy steels of equal hardness.

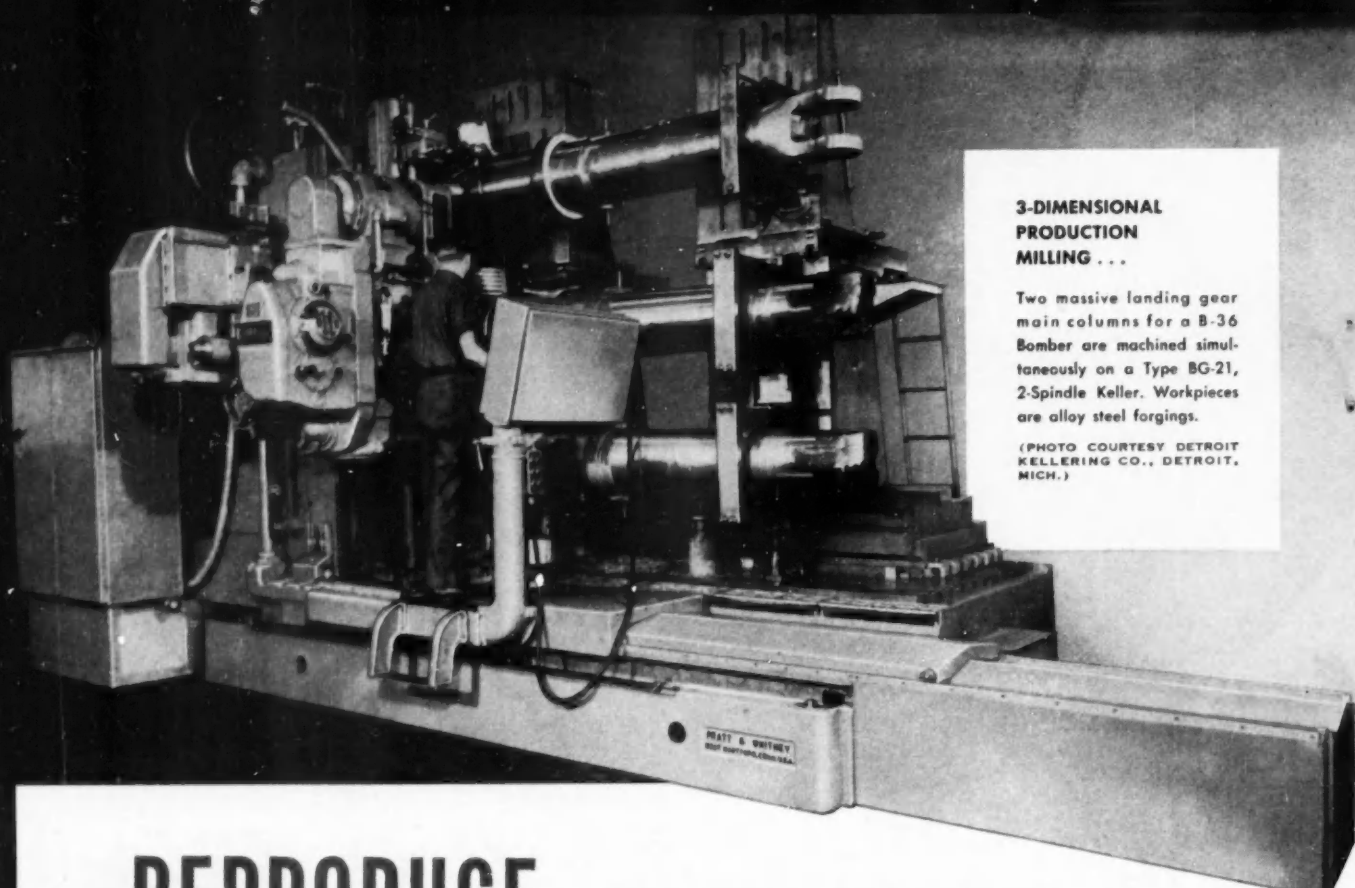
STRESSPROOF is stocked by leading steel warehouses from coast to coast.

Write for your free copy of this helpful new brochure, "Make Your Own Repair Parts."

La Salle **STEEL CO.**

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Phone: Sheffield 6090





3-DIMENSIONAL PRODUCTION MILLING . . .

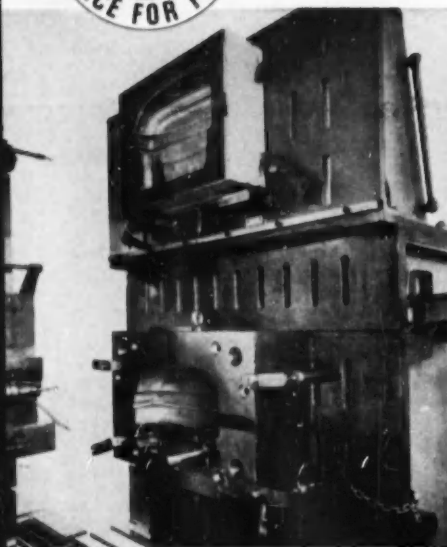
Two massive landing gear main columns for a B-36 Bomber are machined simultaneously on a Type BG-21, 2-Spindle Keller. Workpieces are alloy steel forgings.

(PHOTO COURTESY DETROIT KELLER CO., DETROIT, MICH.)

REPRODUCE COMPLEX, IRREGULAR SHAPES

METAL FORMING AND DRAWING DIES • FORGING DIES • PLASTIC MOLDS
RUBBER MOLDS • DIE CASTING DIES • METAL PATTERNS • CAMS
PROTOTYPE WORK • PRODUCTION MILLING • AND MANY OTHER JOBS

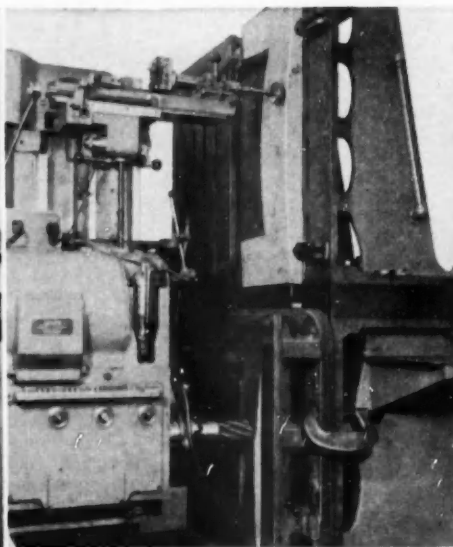
faster and more economically



DIE CASTING DIE . . .

to produce metal shrouds for 25 hp outboard motors. Cavity was deep, intricate, and involved heavy metal removal. Cavity was completely Kellered in only 219 hours on a BG-21 Keller.

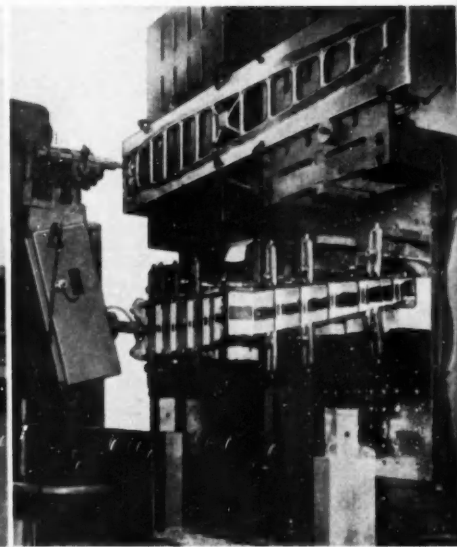
(PHOTO COURTESY ATOLS TOOL AND MOLD CORPORATION, CHICAGO, ILLINOIS)



DRAW DIE . . .

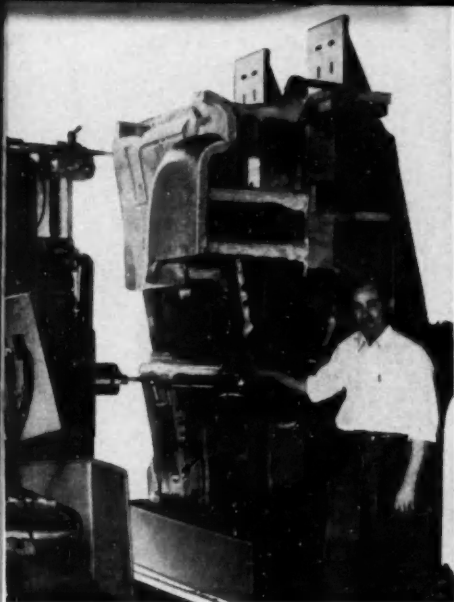
for a motor truck cab door, approximately 48" x 70". The complete job was produced quickly and economically on a Pratt & Whitney Type BG-21 Keller Machine.

(PHOTO COURTESY BUFFALO TOOL & DIE MFG. CO., BUFFALO, N.Y.)



PROFILE MILLING . . .

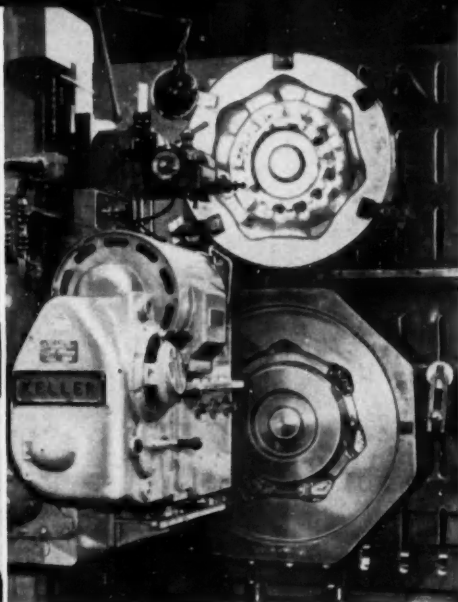
an aluminum aircraft wing spar is fast and easy with "Kellering." The only template usually required for this type of work is a simple, 2-dimensional template.



BODY FORMING DIE...

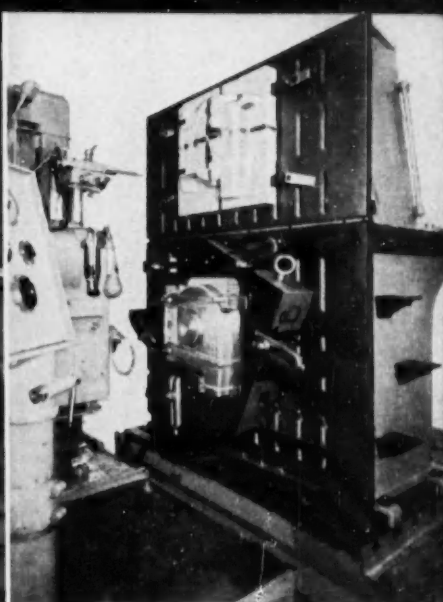
machined by full 3-dimensional tracer-controlled milling from an intricate plaster model. The finished die will be used to form a complete section for the famous Fisher Bodies.

(PHOTO COURTESY SONITH PATTERN WORKS, INDIANAPOLIS, IND.)



FORGING DIE...

Using a cement master cast from a wooden pattern, the Keller BG-21 duplicates the complex cavity in an aircraft engine forging die. "Kellering" accuracy on this type of work greatly reduces hand finishing cost.



IMPRESSION DIE...

18" x 24" x 4" to produce covers for an 18" rotary lawn mower (trade name "Lawn Boy"). Working from a plaster model, a Type BG-21 Keller Machine does the job rapidly, accurately.

(PHOTO COURTESY JOHNSON MOTORS DIV., OUTBOARD, MARINE & MFG. CO., WAUKEGAN, ILL.)

with **PRATT & WHITNEY** **KELLER** **TYPE BG-21** **Automatic Tracer-Controlled Milling MACHINES**

OBTAINABLE IN CAPACITIES FROM: 4 FT. HORIZONTAL X 2½ FT. VERTICAL . . . UP TO 10 FT. HORIZONTAL X 4 FT. VERTICAL.

P&W KELLER Machines are powerful, horizontal spindle milling machines with electric tracer control. They reproduce the shape of any 2-dimensional template or 3-dimensional model accurately and economically; total machining time is much less than that required by other methods. Complicated shapes are duplicated as easily and efficiently as simple ones. The initial job is done more economically, and additional duplicates are produced at a fraction of the usual cost and time.

Keller Machines are designed and built specifically for tracer-controlled milling . . . not just "adapted" . . . and can take on a wide variety of jobs

without requiring major adaptation by costly attachments. They are rugged machines that will operate dependably and accurately year after year without expensive maintenance.

IN ADDITION TO THE NEW TYPE BG-21, LARGER AND SMALLER SIZES OF KELLER MACHINES CAN BE FURNISHED.

WRITE NOW FOR COMPLETE INFORMATION

See how P&W Keller Machines can help reduce machining time and costs and increase your profits. Fill in the attached coupon and mail for your free copy of Circular No. 565 that completely describes the versatile new Type BG-21 Keller.



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DIVISION NILES-BEMENT-POND COMPANY
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SINCE 1860

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Best thing next to a bearing!

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Chicago Rawhide brings the world's widest experience to any oil sealing problem . . . and unequalled resources of research, engineering and production. C/R's specialized sealing materials include Sirvene synthetic rubber . . . Sirvis mechanical leather . . . and the new **Conpor** leather (which gives complete lubricant control). Each of these materials offers special advantages for a wide range of applications under varying operating conditions. Chicago Rawhide engineers will be glad to work with you in developing the right material for your problem and cooperate on special designs. Or, you may be able to select the right C/R seal from 17 standard types and more than 1800 sizes. Write us, if you would like a copy of "C/R Perfect Oil Seals".



PERFECT
Oil Seals

More automobiles, farm and industrial machines rely on C/R Oil Seals than on any similar sealing device

CHICAGO RAWHIDE MANUFACTURING COMPANY

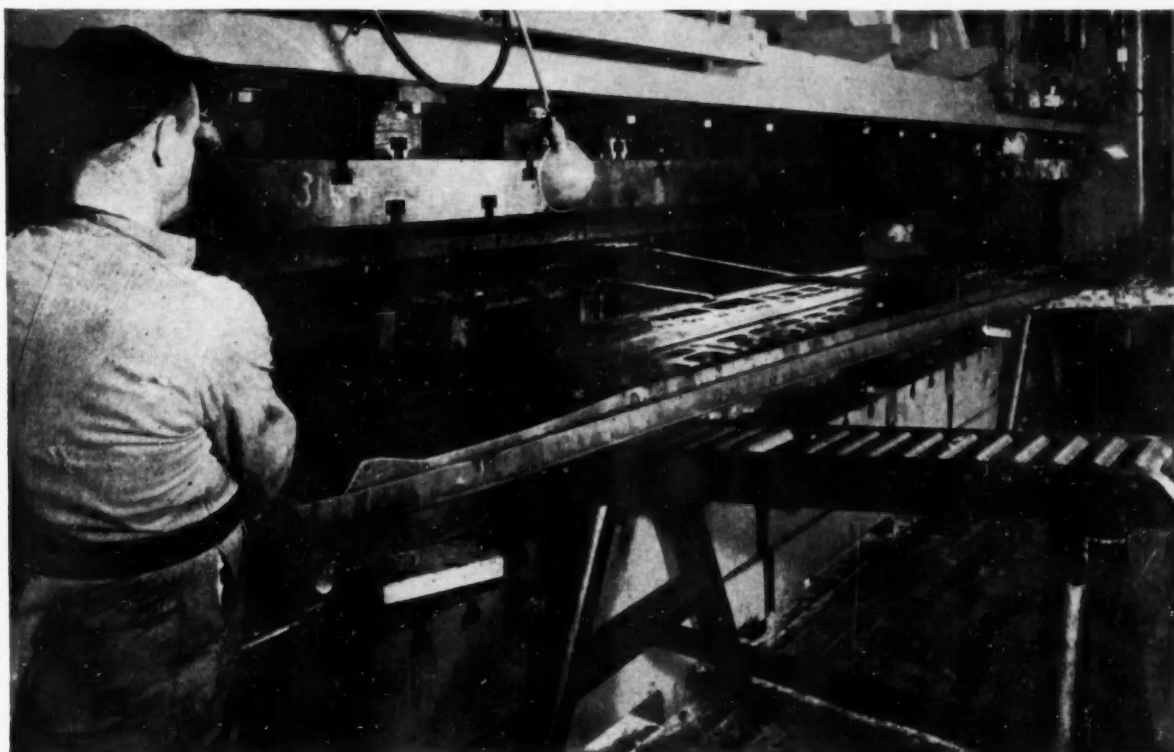
1310 Elston Avenue OIL SEAL DIVISION Chicago 22, Illinois

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MANUFACTURED AND DISTRIBUTED IN CANADA BY SUPER OIL SEAL MFG. CO., LTD., HAMILTON, ONT.

Other C/R products

SIRVENE: (Synthetic rubber) diaphragms, boots, gaskets and similar parts for critical operating conditions • CONPOR: Controlled porosity mechanical leather packings and other sealing products • SIRVIS: Mechanical leather boots, gaskets, packings and related products.



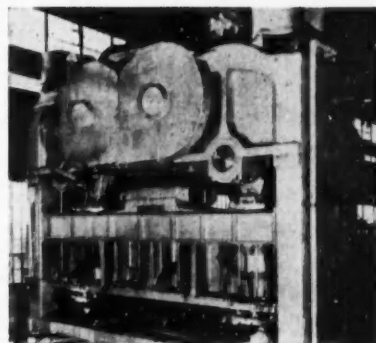
LARGEST MECHANICAL PRESS EVER BUILT

New Hamilton 4000 ton capacity press, in which there is no relative deflection in bed and slide, forms side rails that are perfectly straight

This Hamilton Side Rail Press was placed in production last winter in the Cleveland Plant of Midland Steel Products Company. It is an enormous machine, weighing 900 tons, which in itself is newsworthy. However, the outstanding feature is its ability, when loaded to 4000 tons pressure (its nominal capacity) to form perfectly straight side rails, without camber or "bow." This eliminates the subsequent straightening operation which has been the accepted customary practice in chassis frame manufacture.

OTHER "HIGHLIGHTS" OF THIS 4000 TON HAMILTON PRESS

- The bed is equipped with six 42-inch diameter air cushions providing 415 tons pad-pressure with air at 100 psi.
- The cushions are linked together and the operating valves are controlled by one pilot valve so that the six cushions function as a unit at all times.
- Overall height 44 feet with topmost point 30 feet above floor.
- 320 inch clear space between the uprights and gibs; shut height on bed 40 inches.
- Stroke of slide 22 inches; adjustment 12 inches.
- Drive motor 150 hp; slide adjusting motor 25 hp.



NEW HAMILTON PRESS at Midland Steel Products Company, Cleveland, Ohio is shown at top forming perfectly straight 22 ft. side rails of $\frac{3}{8}$ -in. steel without camber or "bow."

HAMILTON PRESS DIVISION
Baldwin-Lima-Hamilton Corporation
Curtis Building
Detroit 2, Michigan

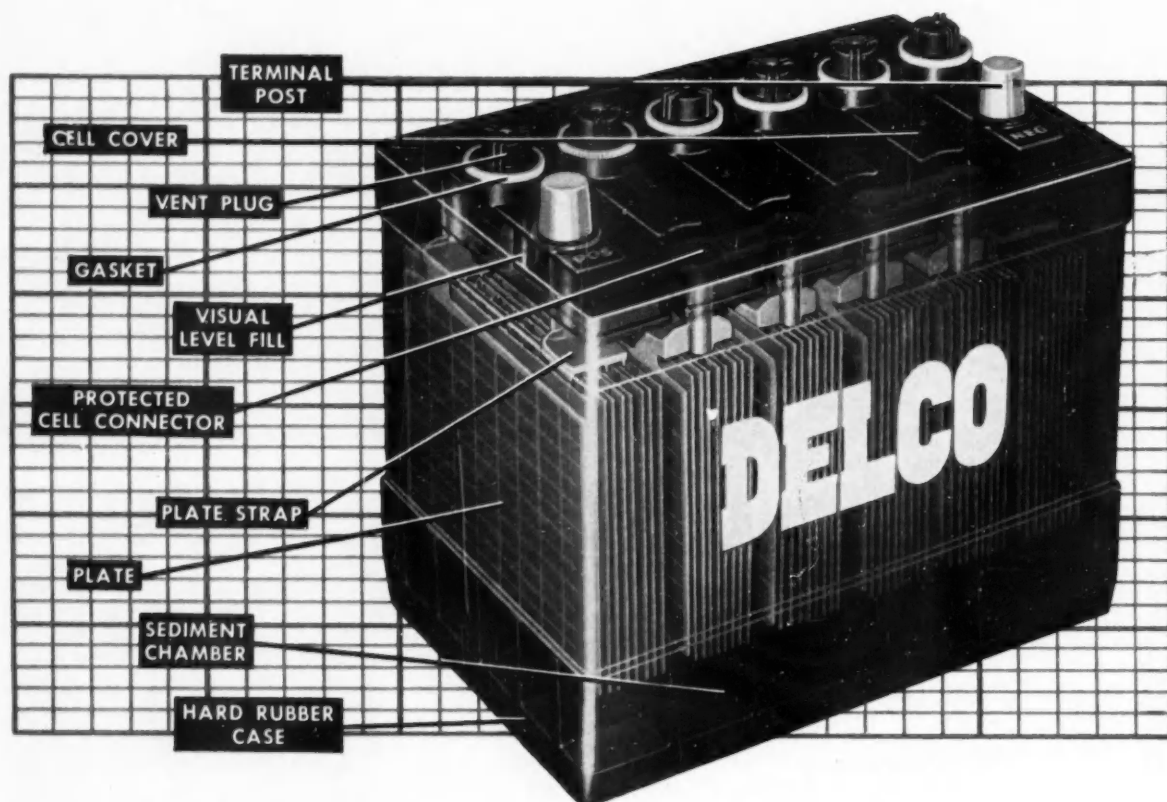


BALDWIN-LIMA-HAMILTON

Branch Offices: New York • Chicago • Factory: Hamilton, Ohio

Progressive Engineering

DELCO-REMY'S NEW 12-VOLT BATTERIES



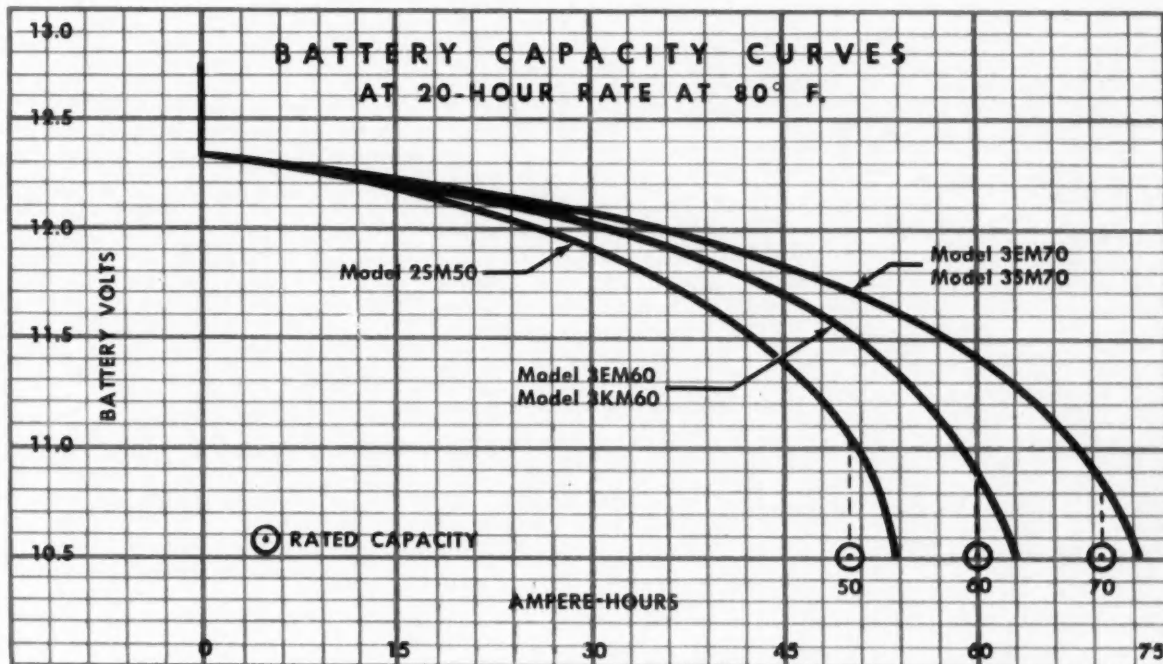
The new Delco 12-volt batteries are outstanding performers in Delco-Remy's 12-volt electrical systems for passenger cars. Like the other units in these high-performance systems, the new batteries are built to exceed conventional requirements. Newly designed throughout, the new batteries are available in a range of sizes and capacities to more than meet the needs of every application. Various cell arrangements provide a choice of terminal post locations for top efficiency, safety, and economy.

A typical new 12-volt battery, as shown, includes many important design features that contribute to its overall efficiency and dependability. For example, note the thermo-rigid hard rubber case that resists warping at highest under-hood temperatures . . . cell covers equipped with "full view" visual level fill indicators for easier inspection and filling . . . new dome-type vent plugs that reduce acid spray . . . special clinging synthetic elastic sealing gaskets which stay put to prevent electro-

AUTOMOTIVE, TRACTOR AND MARINE ELECTRICAL EQUIPMENT

Makes the Difference

FOR PASSENGER CARS ASSURE AMPLE ELECTRICAL CAPACITY



lyte leakage . . . the corrosion-proof top made possible by improved cover design and connectors protected by sealing compound . . . the generous reserve acid volume both above and below the plates. Unseen, but equally important, is the new "all-season gravity," an electrolyte adjustment best suited for all-year performance.

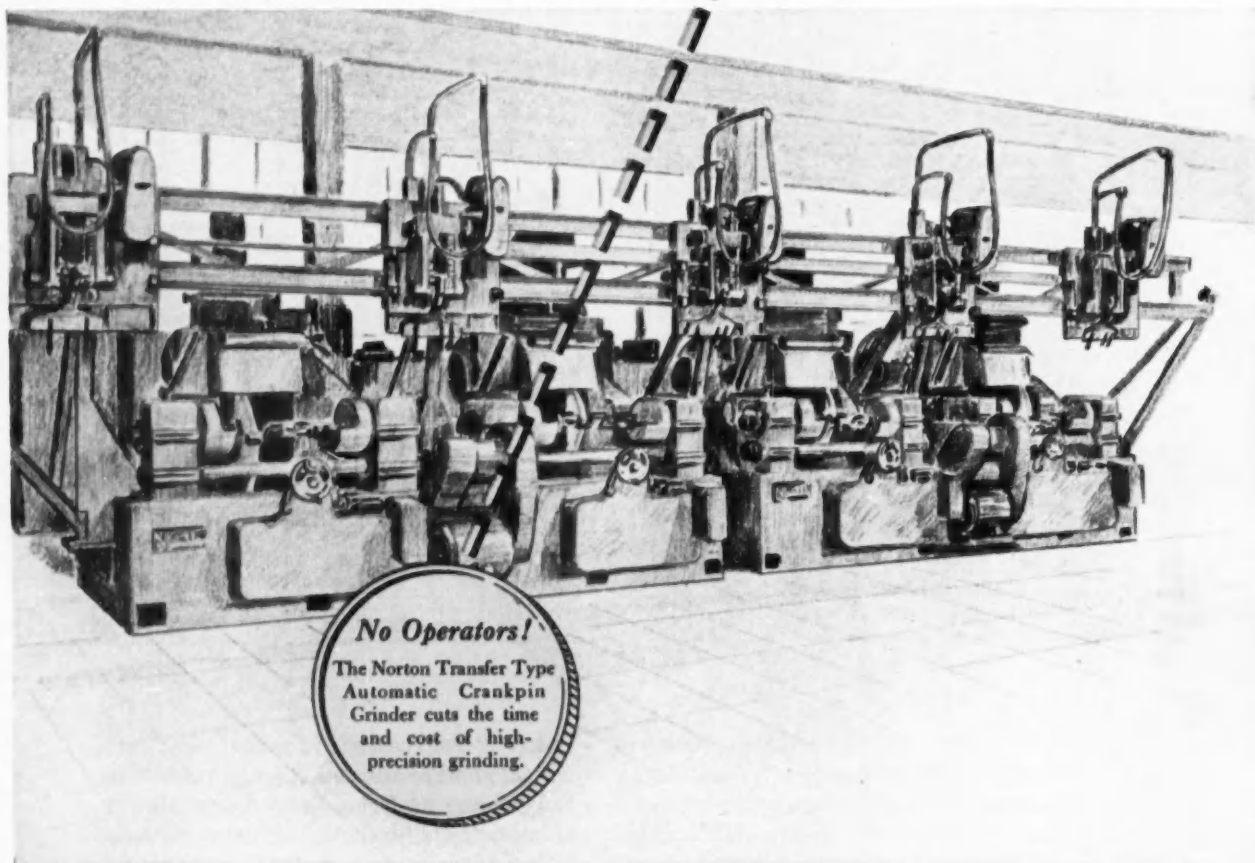
Delco 12-volt batteries for passenger cars are yet another example of how Progressive Engineering at Delco-Remy keeps always abreast—usually ahead—of developments in the automotive industry. You may be sure that Delco-Remy will be ready whenever the need arises for even more advanced electrical equipment.

Delco-Remy

DIVISION, GENERAL MOTORS CORPORATION, ANDERSON, INDIANA

AUTOMOTIVE, TRACTOR AND MARINE ELECTRICAL EQUIPMENT

Norton Introduces **AUTOMATION** **IN CRANKPIN GRINDING**



No Operators!

The Norton Transfer Type Automatic Crankpin Grinder cuts the time and cost of high-precision grinding.

All the operators' manual duties now mechanized in crankpin grinding

It was a good question:

Can an operation as intricate and exacting as grinding a crankpin be done by automated machines?

The question is a question no more.

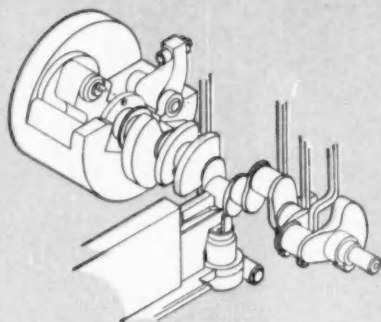
Norton has answered it, "Yes."

Now *all* the manual motions once required of operators are handled automatically. Norton's

modern machine for this really tough cylindrical grinding job does all adjusting, controlling, gauging and transferring of the work — plus the rapid, low-cost, high precision grinding required.

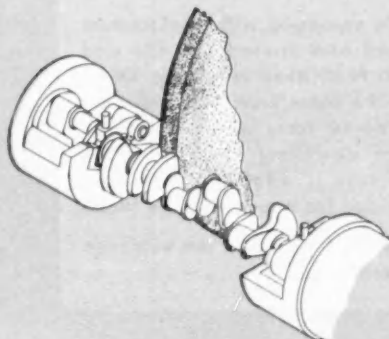
It is another Norton first. Norton is making rapid progress in applying Automation to various types of grinding.

4-way automation in new Norton machine



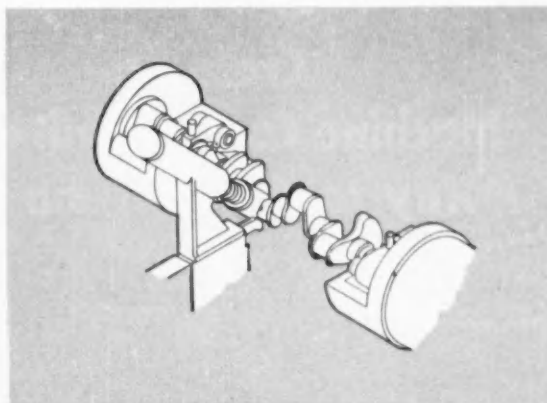
1. It adjusts automatically

Norton Automation locates the work in the grinder both angularly and longitudinally by built-in mechanism . . . grinding wheels are trued automatically . . . automatic compensation for reduction in wheel diameter is made by the feeding mechanism.



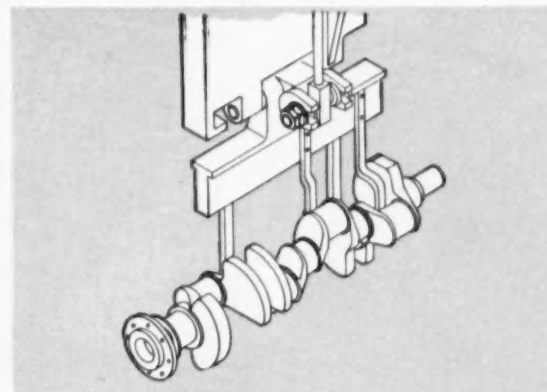
2. It grinds automatically

Being completely automatic, the grinders operate close to 100% efficiency all the working day. They can be pre-set to operate at a definite rate of production continuously. The unit can be controlled, when necessary, to by-pass any in-operative station.



3. It gauges automatically

Spark-out and work size are controlled by an electric gauge which contacts the work during grinding and automatically terminates the cycle by retracting the wheel slide when size is reached.



4. It transfers automatically

Five transfer units travel vertically to pick up and deposit the crankshafts at each station, moving simultaneously. These units are joined together, moving in unison horizontally to transfer the work between stations. The final unit carries ground crankshafts out of transfer machine.

New Automated Grinders Soon to Come . . .

This crankpin grinder is only one of many Norton advances in Automation. For more information about this and other Norton Automated Grinders, write Norton or see your Norton representative. And remember: only Norton offers you such long experience in both grinding machines and grinding wheels to help you produce more at lower cost. For more information, write NORTON COMPANY, Worcester 6, Massachusetts.

To Economize, Modernize with NEW



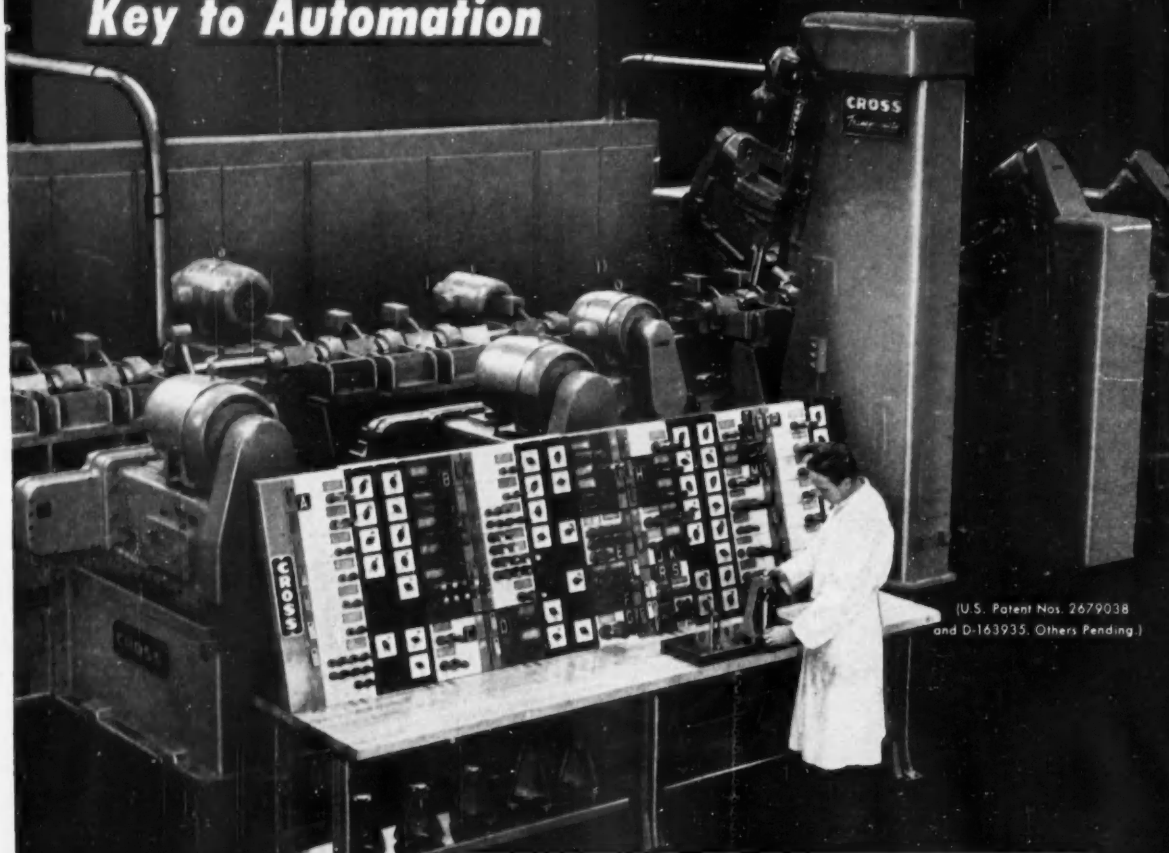
GRINDERS and LAPPERS

Making better products . . . to make other products better

District Sales Offices: Worcester • Hartford
New York (Teterboro, N. J.) • Cleveland • Chicago • Detroit

Cross Machine Control Unit— Key to Automation

*A Mechanical Eye
to Watch Your Tools*



(U.S. Patent Nos. 2679038
and D-163935. Others Pending.)

The greatly increased number of tools used in modern transfer-type machines makes adequate tool control a "must." The Cross Machine Control Unit was developed to meet this need—to cut downtime by programming tool changes . . . to reduce tool expense.

The Cross Machine Control Unit is equipped with Toolometers which furnish a visual record of used and unused tool life and automatically stop the machine when tools need changing. Other tools almost used up are replaced at the same time. This grouping of changes, plus the availability of pre-set tools which are stored in the Machine Control Unit, reduces downtime. And downtime for machine adjustments and trial cuts is eliminated because standard fixtures and gages are provided for pre-setting the tools.

Over 300 Cross Machine Control Units now in use are evidence of cost saving benefits. Get full information today.

Established 1898


THE

CROSS

CO.

DETROIT 7, MICHIGAN

Special MACHINE TOOLS



To our Favorite Boss!

From the receptionist at the front door through to the last man on the loading platform—all of us here at Great Lakes Steel have a very important *something* in common. It is the knowledge that your continued and expanded need for our products determines the future and growth of every one of us, regardless of our individual jobs here.

It is the knowledge that *you*, Mr. Customer, are the boss!

That's why we at Great Lakes are seeing to it that our steel is the kind you have a right to expect from a specialist in flat-rolled products. We know the importance of prompt shipments, top quality, proper packaging and loading, dependable information, and clerical accuracy. We think you'll agree that our many satisfied customers are a pretty good indication that this policy is good business for all concerned.

Next time you have a problem in steel, call on one of our representatives to help you solve it. You'll be glad you did!

Great Lakes Steel

Ecorse, Detroit 29, Michigan

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NATIONAL STEEL CORPORATION

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For Permanent Mold Castings

A complete line of

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ALUMINUM MELTING and HOLDING FURNACES

Lindberg-Fisher manufactures all types of Aluminum Melting and Holding Furnaces for permanent mold application—Gas-Oil-Electric resistance.

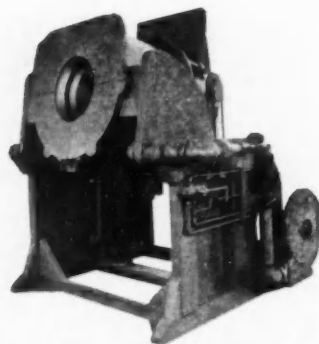
Lindberg-Fisher engineers can intelligently recommend the type of furnace to best suit your needs and conditions.

*Melting specialists for 25 years
Sales and service offices in principal cities*

**LINDBERG
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MELTING FURNACES

A Division of Lindberg Engineering Company, 2491 West Hubbard Street • Chicago 12 • Illinois



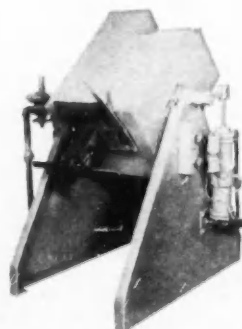
Lindberg-Fisher type HNP Hydraulic Nose-Pour Tilting Crucible Furnace. Pouring lip is located in the axis of tilting providing a constant pouring arc regardless of degree of furnace tilt. Capacities up to 1000 lbs. of aluminum. Oil or gas fired. Described in Bulletin 57-A.



Lindberg-Fisher type ADC Aluminum Melting and Holding Furnace. Capacities up to 1000 lbs. of aluminum. Oil or gas fired. Described in Bulletin 301.

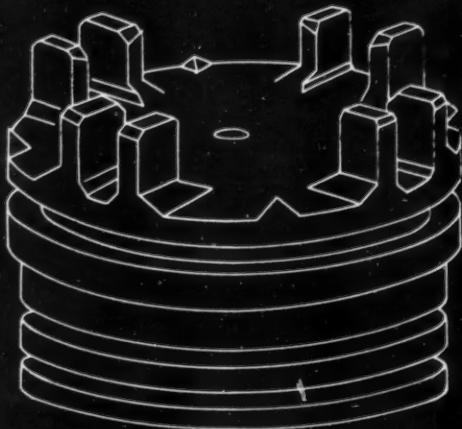


Lindberg-Fisher Electric Resistance Aluminum Melting and Holding Furnace equipped with heavy duty resistance elements which give uniform distribution of heat, insuring long element and pot life. Capacities up to 1000 lbs. of aluminum.



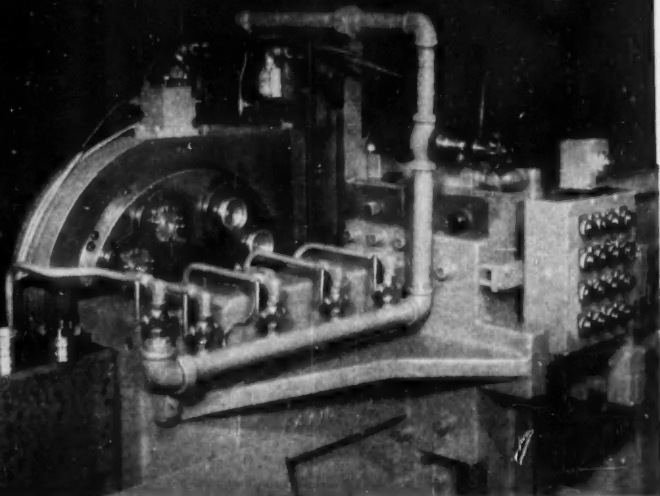
Lindberg-Wessel Casting Machine produces quality aluminum castings on a semi-automatic basis using either graphite or steel molds which are attached to the machine. Described in Bulletin LW.

truly phenomenal production!



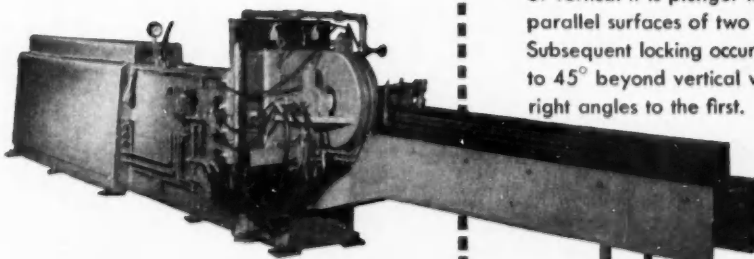
NOZZLE PART

425



HP 40 HORIZONTAL 90° STROKE

Hydraulic BROACHING MACHINE



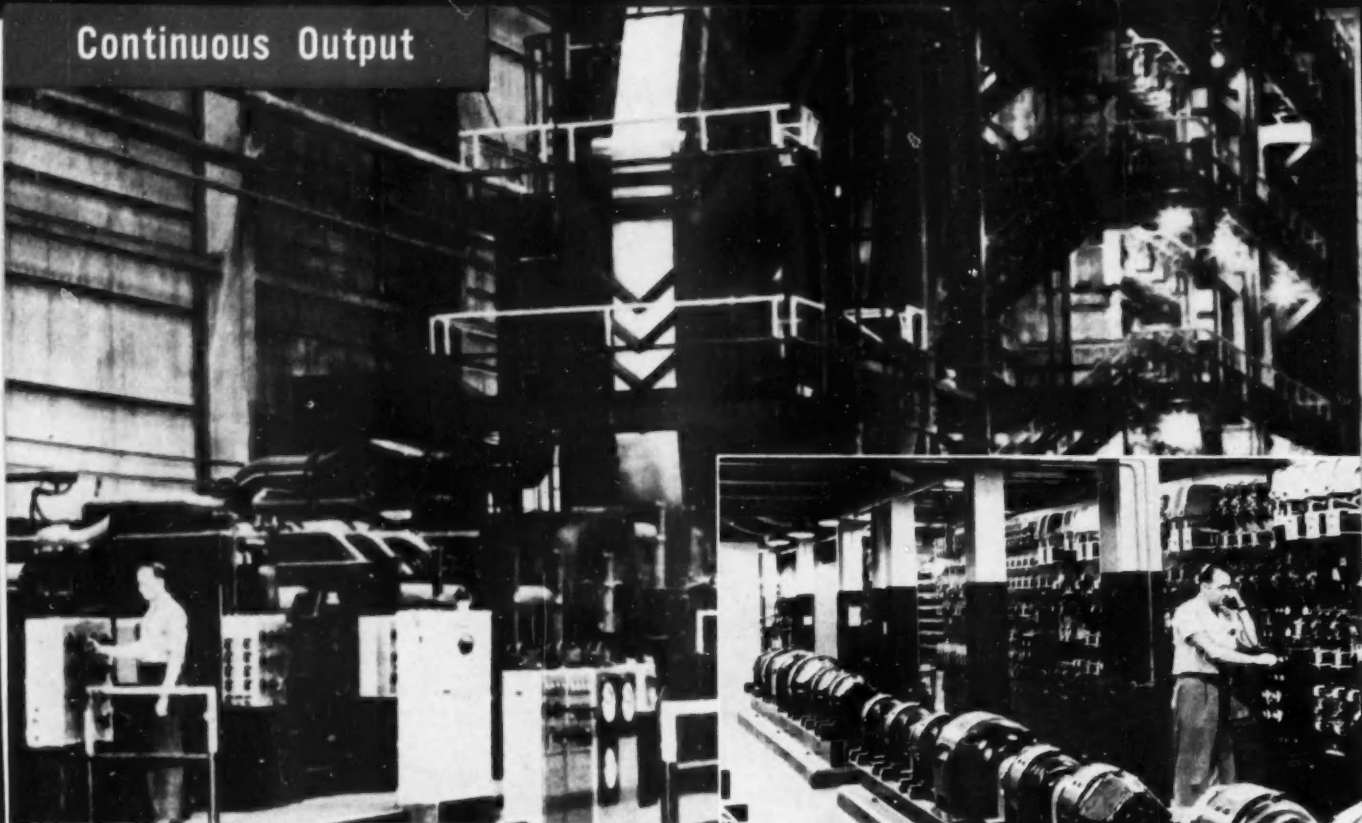
automatic operations!

Clamping and unclamping of parts, advance into broaching position, retraction for the return, and rotation into successive locked positions are all automatic . . . with full electrical interlock . . . so the operator's chief duty is to unload and reload parts! The efficient LAPOINTE-built fixture has a rotor mounted on a horizontal axis with 4 pairs of part nests spaced 90° apart. Parts are loaded in pairs. As the rotor turns into position 45° ahead of vertical it is plunger-locked for the initial cut, broaching the parallel surfaces of two pairs of trunnions in a single pass. Subsequent locking occurs when the rotor has automatically indexed to 45° beyond vertical where the second broaching cut is made at right angles to the first.

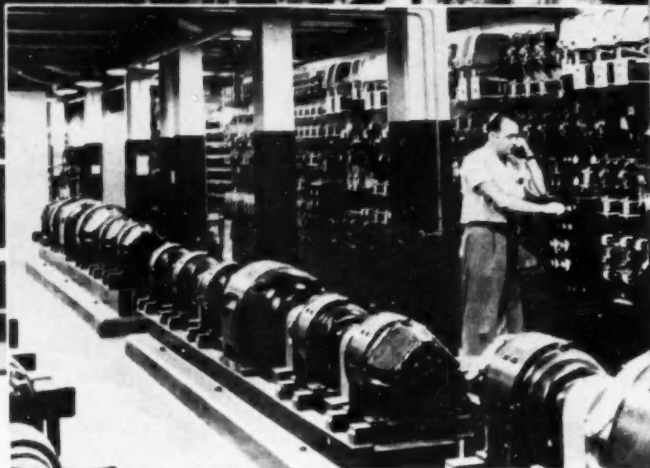
Complete specifications are
given in Bulletin **HP-10**



Continuous Output

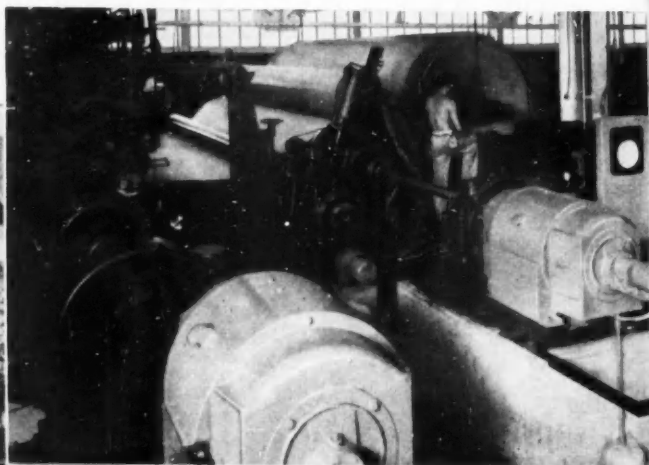


Co-ordinated G-E drive and furnace help produce up to 30 tons/hour of annealed strip. Adjustable voltage d-c generators co-ordinated by modern control provide smooth, fast, precise operation.



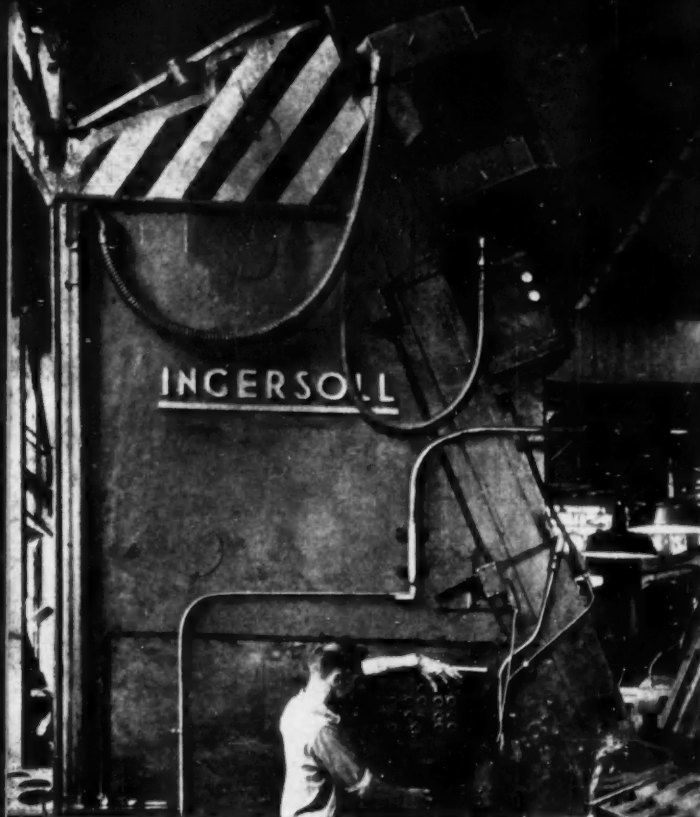
How General Electric d-c drives

Accurate speed from d-c drive co-ordinates sections of paper machine into fast flow of production—up to 300 tons/day. Mechanical design of machine is simplified, output increased.

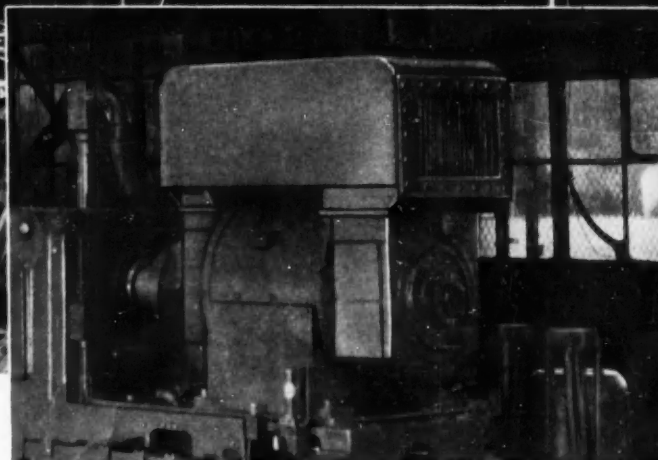


Accurate Speeds

Controlled Power



Controlled cutting power is provided by unit-cooled d-c motors. Torque and speed of this boring mill for diesel engine blocks is maintained at optimum point for long tool life and top production.



help make production automatic

DC MOTORS STEP UP PRODUCTION THROUGHOUT INDUSTRY

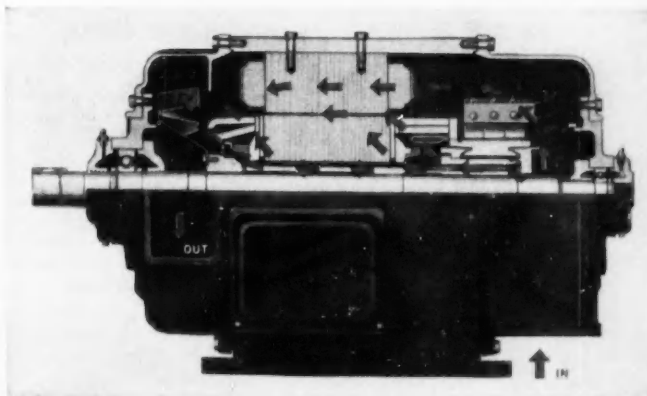
DC drives give you precise control of torque, speed, and power—essential in automatic production. The degree of precision depends on the steady performance and continuity of service of d-c motors and generators. In applications requiring close speed regulation, quick reversing, severe peak loads, G.E.'s complete line of Type CD-1000 motors is:

ECONOMICAL—the right speed at all times means less waste, fast production and low manufacturing costs per unit.

EASY TO MAINTAIN—built for long life with occasional inspection only—easily removable inspection covers. All connections are enclosed, yet easily accessible.

VERSATILE—Today's industry is more automatic than ever before. Regardless of application—in steel, paper, machine tool, and many other industries—G-E direct-current motors have gained the reputation of delivering continuous output at lower costs and accurate speeds for peak production.

FOR MORE INFORMATION, contact your nearest Apparatus Sales representative, or write for bulletin GEA-5497, general-purpose d-c motors, or GEA-6091A, totally-enclosed unit-cooled d-c motors. Section 810-4, General Electric Co., Schenectady, N. Y.



Excellent ventilating system gives positive ventilation to entire motor. Shaft fan on armature helps dissipate heat and keeps motor within rated temperature rise.

GENERAL  ELECTRIC

Bendix power

STEERING AND BRAKING

sets new standards
of driving ease
and safety



Today's most wanted power features for cars and trucks.



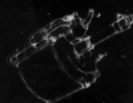
Bendix * low pedal POWER brake

Specified by more car manufacturers than any other make, Bendix Low Pedal Power Brake makes possible quick, sure stops by merely pivoting the foot from stop-and-go controls. No need to lift the foot and exert leg power to bring the car to a stop. Result—more driving comfort, less fatigue and greater safety!



Bendix * POWER steering

Because Bendix Power Steering is of the linkage type, vehicle manufacturers find it especially adaptable for production line installation, without extensive engineering changes. Manufacturers can now meet the increasing demand for power steering more efficiently and more economically with Bendix Power Steering.



Bendix HYDROVAC* POWER brake

With over four million in use, the Bendix Hydrovac is by all odds the world's most widely used power brake for commercial vehicles. This overwhelming preference for Hydrovac is a result of sound engineering design, exceptional performance, low original cost and minimum service upkeep.



Bendix AIR-PAK* POWER brake

With one simple compact unit, Bendix Air-Pak combines all of the well-proven advantages of hydraulic brake actuation with an air brake system. An important advantage of Air-Pak is that brakes can be applied by foot power alone when braking is required before air pressure builds up or if it should fail for any reason.

*REG. U.S. PAT. OFF.

Prospects are easier to sell and owners are better satisfied with cars equipped with Bendix power steering and braking.

For example, the Bendix Low Pedal Power Brake is by all odds the most popular and best proven power brake offered by any passenger car manufacturer today, and vehicle manufacturers can quickly and economically adapt the popular Bendix Power Steering to their present

design without extensive engineering changes.

For truck manufacturers and operators, Bendix Hydrovac and Air-Pak have long been overwhelming favorites in the field of power braking for commercial vehicles.

That's why if you build, buy or sell passenger cars or trucks, it will pay to make sure they are equipped with Bendix power braking and steering.

BENDIX PRODUCTS DIVISION SOUTH BEND INDIANA

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High Spots of This Issue

★ Greater Number of Cars Finish Grueling Mexican Race

Twisting through some of the world's most tortuous terrain, the 1908-mile course of this year's Pan-American Race naturally claimed its share of victims, but fewer than before. Here is an on-the-spot account of the exciting Mexican classic. Page 48.

★ Machining Huge Dies With Special Equipment

The design and construction of a band saw and filer large enough for the huge extrusion dies used in the Air Force Heavy Press Program was a problem to tax any machine tool builder's ingenuity. This is how DoAll Co. met the challenge. Page 52.

★ Current Engine Problems Discussed at SAE Meetings

A variety of subjects, ranging from gum deposits to cold starting, were studied and debated at three recent national SAE meetings. Discussion highlights are reviewed here, along with abstracts from three technical papers presented. Page 54.

★ Developments in Production Without Chips

In view of the constantly pressing demand for materials, U. S. industry is under compulsion to get maximum utilization from the available supply. How chip losses may be cut by using other production techniques is studied in this article. Page 64.

★ Station Wagon Popularity Continues to Increase

Nothing short of phenomenal is the surge in demand for station wagons during the last few years. Such factors as the swing to suburban living and its expanding versatility for business uses have given this special vehicle a boost. Page 100.

★ 46 New Product Items And Other High Spots, Such As:

Chevrolet air conditioning and power steering; mammoth milling machine; fluid coupling adapted; free piston gas generator turbine; automated machines in ball bearing plant; objectives of Studebaker-Packard Corp.; special cars at West Coast Motorama; upholstery items by embossing; and Deutz Diesel engines.

Automotive and Aviation News, Page 33
Complete Table of Contents, Page 3



seamless or... welded?

Ryerson tubing experts help you select from world's largest stocks

Seamless or welded? Hot or cold rolled? Round or square? Whatever the type, size and wall thickness—you get what you need, quickly, when you call Ryerson for tubing.

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News of the AUTOMOTIVE AND AVIATION INDUSTRIES

Vol. 111, No. 12

December 15, 1954

Hudson Plants to Work On Three New Contracts

Plants operated under the Hudson Special Products Div. of American Motors Corp. next year will start work on three new classified defense contracts the corporation received from the Government last month. Hudson, under two previous contracts, has been producing aircraft parts.

While the value of the contracts also was not disclosed, it was previously reported that about \$500 million in new defense work is expected to be awarded to automotive plants in the next fiscal year which ends in June. No portion of that money has been specifically earmarked for aircraft work.

Ford May Be Next With Turbine Car

Next automobile company expected to come out with gas-turbine-driven experimental car is Ford. Unconfirmed reports say that the turbine will be equipped with a regenerator, and that it can be built of conventional metals rather than the high heat-resistant types required in current turbines.

Murray Ends Body Work; Diversifies Production

Now that Murray Corp. of America has officially gone out of the automobile body-building business, it will use its former automotive plant in Detroit for the production of pin-setting machines for bowling alleys. The Russell St. facility will be one of eight divisions which Murray will operate under its 1955 organizational plans.

A program for liquidating the assets of the Body Div. is well under-



JAGUARS MAKE BOW IN U. S. SHOWROOMS

Typical of the new 1955 Jaguar line for the U. S. market is the XK-140 Super Sports Roadster. A more powerful version of the XK-120, it is offered with either a Borg-Warner automatic transmission, or a standard gear shift with Laycock de Normanville overdrive. The car is powered by a 190-hp twin overhead camshaft engine. Prices range from \$3450 to \$3745 fully equipped at coastal ports of entry.

way, and defense work at the Russell plant is expected to be completed by the end of the year. Murray, which has been building automobile bodies for more than a quarter of a century, is still continuing some automotive work by producing chassis frames at its Ecorse, Mich., plant. It plans to diversify its production more soon.

Murray's biggest automotive customers in recent years have been Hudson, Kaiser, and Willys, but they have started building their own bodies. Since the Government's defense program was revised, Murray has been getting less work, and present contracts will expire without further extensions.

Out of a total \$112.5 million in sales for the fiscal year ended Aug. 31, Murray's defense and automotive work amounted to \$48 million. Earnings were reported at \$5.817 million, compared to \$4.054 million in the previous fiscal year.

Lockheed Out to Develop A New Type of Airliner

Lockheed Aircraft Corp. is developing a new plane which may become the first U. S.-designed turboprop or straight jet airliner. It is expected to be powered by four Pratt & Whitney T-34 turboprop engines and to achieve a speed of over 400 mph. The plane would somewhat resemble the Constellation but have a thin wing for high speed, it is reported.

Trend to 12-Volt System Expected

The trend toward 12-volt electrical systems, now universal across GM passenger car lines, probably will pick up in 1956. At least one other large company is studying the idea of adopting it on its 1956 models, but it apparently hasn't decided yet whether to make the system standard or optional equipment.

News of the AUTOMOTIVE



ALL-ALUMINUM TRUCK DEVELOPED FOR ARMY

The T-55 experimental 2 1/2-ton truck, developed for the Army by Chrysler Corp., has a body made of aluminum, including wheels and axles, for a total weight of only 9000 lb. Special features are: fuel injection system; hydraulic disk brakes, ball joint suspension; interchangeable front and rear axles; torsion bar suspension; automatic transmission; and plastic top over the cab. Powerplant is a six-cylinder, 200-hp unit.

New Packard V-8 Engine Breaks Stock Car Record

Official confirmation that Packard will use a new V-8 engine in its 1955 cars came with the announcement that a Packard four-door sedan, equipped with such an engine, completed a 25,000-mile endurance test at the company's proving ground in Utica, Mich. Specific details about the engine, such as horsepower and compression ratio, however, are being withheld until January, when the company will bring out its new line.

The tests reportedly topped any stock car performance now on AAA records. The car traveled the 25,000 miles in 238 hours, 41 minutes and 44.3 seconds for an average of 104.737 mph. Pit stops averaged 49 seconds.

This record, however, does not qualify for official AAA marks because the test was held at a private proving ground. It is claimed that the Packard V-8 topped all existing national closed car records.

Trenton, Mich., Plant Center Of Chrysler Steering Output

Chrysler Corp. will offer "coaxial" power steering on its entire line of 1955 cars. Available previously on only Chrysler and DeSoto cars, the unit replaces the linkage-type power steering on both Dodge and Plymouth.

The integral type unit is being produced at the corporation's expanded Trenton, Mich. plant for all five lines of cars. Chrysler estimates that about two-thirds of all 1955 Chryslers and DeSotos will be equipped with it.

A second assembly line had to be added at the Trenton plant for the production of the "coaxial" unit for Dodge and Plymouth cars. While the basic make-up of the unit is the same for all Chrysler Corp. cars, Dodge and Plymouth require a slightly smaller housing for the hydraulic operating mechanism.

Goodyear Aircraft Develops Light, One-Man Helicopter

Goodyear Aircraft Corp. has disclosed development of a one-man, light helicopter that is designed to serve as either a courier-liaison or tactical craft. The prototype GA-400 R model is now being demonstrated.

Designed primarily for any tactical purpose requiring transportation of one man at speeds up to 60 knots, the plane has an airframe of welded aluminum tubing, supported by steel outrigger tubes on the alighting gear of parallel aluminum skids. Power is supplied by a water-cooled, two-stroke engine driving rotors through a belt and pulley arrangement. Gross weight of the craft is slightly over 400 lb.

Lincoln Holds Price Line On Its 1955 Model Cars

Suggested factory-delivered retail charges for 1955 Lincoln and Lincoln Capri cars will remain the same as for comparable 1954 models. Power steering, optional equipment on 1955 models, has been reduced from the former suggested factory-delivered retail charge of \$155.90 to \$129.

Freight charges on cars delivered to points more than approximately 1500 miles from Detroit have been reduced progressively as much as \$49. This is a further adjustment to one made in October.

Prices listed for the 1955 models are factory-suggested and include provision for Federal excise taxes and suggested preparation and conditioning charges. State or local taxes, license fees, optional equipment and accessories are extra.

Lincoln Custom 4-Door Sedan..	\$3,563
Lincoln Custom Sport Coupe....	3,666
Lincoln Capri Special Custom	
4-Door Sedan	3,782
Lincoln Capri Special Custom	
Sport Coupe	3,910
Lincoln Capri Special Custom	
Convertible	4,072

Chevrolet Livonia Plant Nearing Full Production

Chevrolet expects to have its new Livonia, Mich., spring and bumper plant in full production the beginning of next year. Part of General Motors' \$1 billion expansion program started early this year, the 814,000 sq ft plant is equipped with what is believed to be the longest plating line in the world.

Segmented automation is the biggest feature of the new plant. This type of automation enables the plant to keep major segments of a line running in case of a breakdown anywhere along the line. In addition, the plant includes improved treatment and disposal of industrial wastes, and has huge new presses for stamping out bumpers and all equipment for making finished bumpers. The three new plating lines require 1200 miles of wiring.

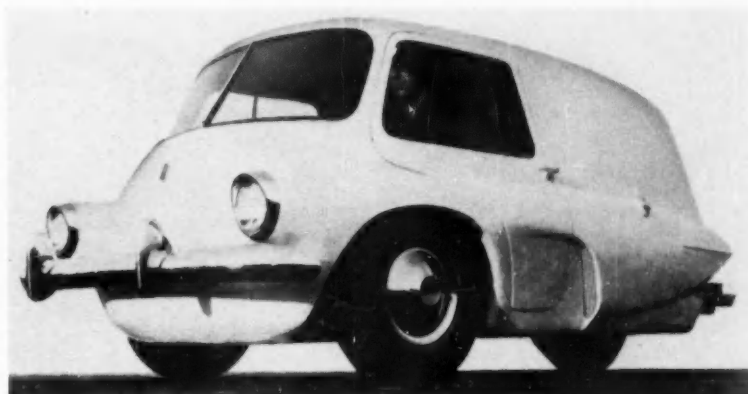
A pressurized atmosphere is provided through a system which pumps a million cubic feet of filtered fresh air a minute into the plant.

AND AVIATION INDUSTRIES

AMC Ups Some Rambler Prices; Claims They are Still Lowest

American Motors Corp. has raised prices of six of the eight 1955 Rambler models by amounts ranging from \$3 to \$69. In doing so, however, it put forth the claim that they are still the lowest competitively in the automobile industry. In support of this statement the company took the unusual step of including in the announcement comparative prices of Chevrolet, Studebaker, Ford, and Plymouth models.

The price advances in some of the Rambler models were attributed to changes in freight rates, product improvements, and increased dealer discounts. In altering its freight charges, AMC is following the pattern already established by Ford, GM, and Chrysler.



STATIONETTE IS GARBED IN PLASTIC

This three-wheeled light delivery car, formerly the Martin Stationette (see *AI*, Feb. 15, 1954, p. 42), is now being introduced by Bassons Industries Corp. with a reinforced plastic body. Overall dimensions of the vehicle, expected to go into production shortly, are: height, 53 in.; width, 64 in.; and length, 106 in. It is powered by a 24-hp, four-cylinder Hercules rear engine at cruising speeds of 40 to 45 mph.

RAMBLER PRICES*

Rambler Deluxe Series	1954	1955
Four-door sedan	\$1,695	\$1,750
Two-door sedan	1,585	\$1,550
Rambler Super Series		
Two-door station wagon (Suburban)	1,869	1,800
Four-door sedan	1,798	1,795
Two-door sedan	1,683	1,700

Rambler Custom Series		
Four-door sedan	1,989	1,965
Two-door Country Club sedan	1,995	1,950
Four-door Cross Country station wagon	2,098	2,050

* Factory-delivered retail prices, excluding state and local taxes, freight, and optional equipment.

Curtice Forecasts an Output Of 5.8 Million Cars in 1955

The most optimistic forecast for the automobile industry in 1955 so far has come from Harlow H. Curtice, president of General Motors Corp. In a nation-wide talk from Flint, Mich., during the corporation's huge celebration marking production of the 50th million GM vehicle last month, Mr. Curtice predicted that the industry will turn out 5.8 million cars during 1955. This figure would be about 10 per cent over the total expected for 1954.

Expressing further confidence in the future, he estimated that GM will build its next 50 million vehicles in the next 15 years or so. During the festive event, which attracted a total of 1,024,027 persons to 125 GM plants and training centers throughout the country, Mr. Curtice also told his audience that he is particularly optimistic about the future because of a growing population and expanded technology in the U. S., resulting in higher employment and standard of living. GM itself plans to increase its total employment of 475,000.

By way of illustrating the vast network of businesses which are in one way or another connected with the automobile industry, Mr. Curtice noted that GM presently has 21,000 companies supplying it with products. He also pointed out that GM has 18,000 dealers selling its cars.

Of significant importance to Flint during the GM celebration was an announcement that the corporation would contribute \$3 million to expand the city's cultural center development program. The center will be an addition to the present Flint Junior College campus and will include a new art institute, theater, and museum of transportation. One of the buildings has already been dedicated as the Harlow H. Curtice Building.

Split in Lincoln-Mercury Division Is Hinted Again

Lending weight to recurring reports of a possible split of the Lincoln-Mercury Div. of Ford Motor Co. into two autonomous operations is the announcement that a second advertising agency has been appointed by L-M to handle Lincoln cars. Both Lincoln and Mercury advertising since 1948 has been handled by Kenyon & Eckhardt, Inc.

However, effective next July, Young & Rubicam, Inc., which was named as the agency for the new Continental Div. of Ford Motor Co., will take over Lincoln advertising. K & E will continue to place ads for the Mercury line of cars, supervise the "Toast of the Town" television show, and handle advertising of the Lincoln-Mercury Dealer Advertising Associations.

1955 Agricultural Almanac Published by Ford Motor Co.

Ford Motor Co. has come out with a new 208-page book containing agricultural information ranging from tips on vegetable and flower growing to raising cattle. The 1955 Ford Almanac is illustrated and contains the latest scientific information on soils, livestock, fertilizers, crops, farm machines, and "how-to-do-it" features.

News of the AUTOMOTIVE



SUPERSONIC FIGHTER FLIES FAR

Shown here in flight is the new F-101A long-range strategic fighter. Nicknamed the Voodoo, it was developed by the Air Force in conjunction with McDonnell Aircraft Corp. Its speed is in the supersonic class, and it is capable of carrying atomic weapons. Two Pratt & Whitney J-57 turbojets power the Voodoo.

Chevrolet Plans to Turn Out Nomad Station Wagon in Steel

According to reports, the Chevrolet Nomad station wagon, which was a hit when shown in plastic at the GM Motorama early this year, will go into production sometime next year in steel, but not as a low-priced car to compete with Nash Rambler. It is possible that the Nomad may be put into the Bel Air series. Although the Corvette sports car will be continued with a plastic body in 1955, a hardtop is also expected to be available next year.

Ford Merges French Plant; Forms New Firm in Paris

On the heels of a merger between Ford's French company and Simca, Ford revealed that it is establishing a completely new French subsidiary in Paris. The new company will handle the distribution of its American, English and German products in France.

Merger of the two companies results in the largest independently owned automobile company in France. Under the terms, Ford Motor Co. will retain about 17 per cent of the shares in the new company. It will receive one share of Simca stock for each 23 shares of Ford S. A. F. (Societe Anonyme Francaise) stock.

The former Ford plant will now operate as the Poissy Div. of Simca

and continue to build and market the Ford Vedette line of cars. Steps reportedly are being taken to list Simca shares on the American Stock Exchange, which formerly listed only Ford S. A. F. stock. Under the terms, Ford will also furnish technical aid to the new company.

Factory Sales of Vehicles Top Five Million to Oct.

Factory sales of motor vehicles in the first 10 months of this year were down more than one million units under the comparable period of 1953. They totaled 5,246,854, against 6,385,520 for the first 10 months of 1953.

Starting out the year with 551,134 units in January, factory sales climbed to a peak of 633,003 in March and, with the exception of June, continued to decline steadily each month thereafter. October, which ushered in the model change-over period, registered the lowest number of factory sales—287,557 units, a sizable drop from the 621,288 cars, trucks, and buses turned out in October of 1953.

Included in the 10 months total this year were 4,390,713 cars, 852,829 trucks, and 3312 buses. Exports, on the other hand, were more than 16 per cent above the 10 months figure of last year in totaling 322,424. Shipments abroad accounted for slightly more than six per cent of total factory sales, it was reported.

1954 Automobile Output To Exceed 5.4 Million

It now looks as though automobile production in 1954 will exceed 5.4 million units, which would mean the third best year by a substantial margin. Output in November was exceptionally good, with many car companies surpassing their 1953 figures for that month sizeably.

At the beginning of the year several of the industry's top officials forecast a decline of from 10 to 15 per cent in 1954 car output. And while production up to November was down roughly 15 per cent under the comparable period last year, the output spurt in the last two months is expected to provide the industry with 5.4 million cars easily, which would be a good showing for the year. Last year's car output totaled 6.1 million.

The 500,000-car output that the industry expected to reach in November was almost accomplished by the Big Three Makers alone. In that month GM, Ford and Chrysler turned out a combined 487,127 automobiles compared with 331,889 in the same month last year, which was the second best year for the industry. Makers are hoping for more than 550,000 cars in December.

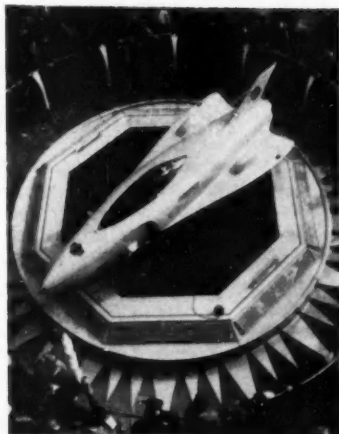
Sales for the year also look good. Although total registrations for the first nine months—the latest figures available—were trailing 1953 by a narrow margin, the spurt in sales in the last several weeks supports optimism. Several makers have reported backlogs in orders, indicating that some models will be in short supply.

While sales of used cars in October showed a slight increase in West and Midwest areas, the national average dropped about 1.7 per cent under the previous months.

IHC Expands Output Of Trucks in Brazil

International Harvester Maquinas, S.A., has announced a project to manufacture 1000 trucks initially in Brazil, to be followed by 5000 trucks five years later. The program includes a planned expenditure of approximately \$2.9 million for equipment to be imported from the U. S.

AND AVIATION INDUSTRIES



FIREBIRD AT PARIS

One of the star attractions at the recent Paris Automobile Show (see A.I., Nov. 1, 1954) was the General Motors XP-21 Firebird gas turbine automobile. This unique vehicle was fully described in the Jan. 15, 1954 issue of this publication.

Conference to Highlight Reinforced Plastics Uses

The Tenth Annual Reinforced Plastics Div. Conference of The Society of the Plastics Industry, Inc., to be held Feb. 8, 9, and 10, in Los Angeles, Calif., will attract a number of representatives from the automotive and aviation industries. Manufacturers of products made of reinforced plastics will speak on a variety of subjects with particular attention given to the uses of reinforced plastics in a variety of fields.

While in the consumption of resins the reinforced plastics section of the plastics industry represents only about one per cent of the total synthetic resin production in the U. S., the interest in and prospects for products made of this combination of materials is constantly on the upswing. Traditionally, the statistics of the reinforced plastics industry are based on the use of polyester resins, whose growth is illustrated below.

1946	1,500,000 lb
1947	800,000 lb
1948	1,800,000 lb
1949	4,500,000 lb
1950	8,500,000 lb
1951	14,000,000 lb
1952	19,000,000 lb
1953	26,000,000 lb
1954 (estimate)	27,000,000 lb

AI TABLOID

Minneapolis - Honeywell Regulator Co. has acquired Doelcam Corp., maker of precision instruments and control equipment for the aircraft and other industries . . . Dow Chemical Co. has purchased Versenes, Inc., chemical specialties manufacturer.

* * *

According to reports, plans are under way for a new 75,000-seat, Indianapolis type race track at Ontario, Calif.

* * *

The Mobile Service School, operated by Clark Equipment Co., has just completed its first year of travel after visiting 43 cities.

* * *

Carnival of Cars is name of new permanent collection of antique automobiles on display at Times Square and 45th St., 1539 Broadway, New York, N. Y.

* * *

General Electric Co. has announced a plan to render financial assistance to American colleges and universities through direct grants of funds.

* * *

Goodyear Tire & Rubber Co. has supplied the material for a rubber railroad crossing in Akron, O. . . B. F. Goodrich Co. has developed a new and tough rubber hose that it claims can outwear steel in some applications.

* * *

Application of a new General Electric CH-10 turbosupercharger to Super Stratocruisers reportedly will increase their range 60 to 100 miles under normal operating conditions.

* * *

Aeronca Manufacturing Corp. has purchased Industrial Research Laboratories. The latter is engaged in basic and applied electro-mechanical research.

Marquardt Aircraft Co. will shortly flight test a two-dimensional ramjet engine for mounting on tips of helicopter rotor blades. Unique folding scheme is said to permit its integration with the rotor blades aerodynamically and structurally.

* * *

Blue M Electric Co. has moved into its new plant at 138th and Chatham St., Blue Island, Ill.

* * *

General Precision Equipment Corp. plans to acquire control of Griscom-Russell Co., heat transfer equipment manufacturer . . . H. K. Porter Co., Inc., has purchased Riverside Metal Co., non-ferrous metals maker.

* * *

Society of Industrial Packaging and Materials Handling Engineers has formed new Southwestern and Central Pennsylvania Divs.

* * *

Aerojet-General Corp. is planning a multi-million dollar expansion program for the manufacture and testing of liquid-fuel rocket engines . . . Lear, Inc., is expanding facilities at its Learcal and Grand Rapids, Mich., Divs. by a total of 118,000 sq ft.

* * *

Lockheed Aircraft Corp.'s C-130 turboprop military assault cargo plane has been officially dubbed "Hercules."

* * *

Texas Eastman Co. is now in production of Tenite Polyethylene plastic. The material will be marketed by Eastman Chemical Products, Inc.

* * *

Jarecki Machine & Tool Co. and Jarecki Products, Inc., have merged to form Jarecki Corp.

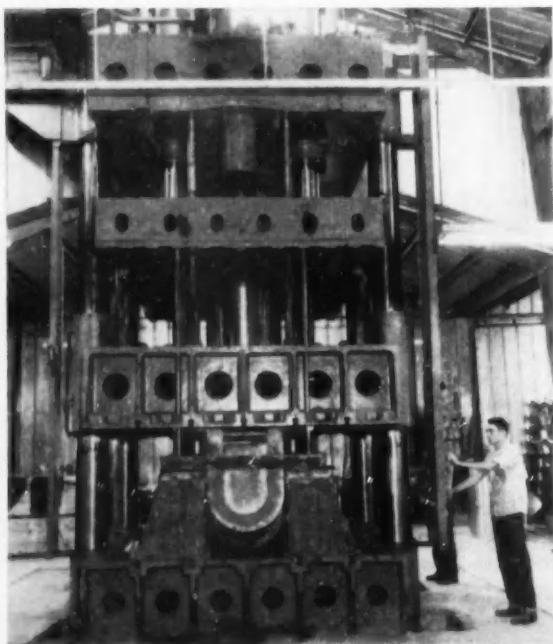
(Turn to page 148, please)

News of the AUTOMOTIVE

NOVEMBER PRODUCTION SPURTS WITH NEW CAR OUTPUT 1954 Passenger Car Production

As reported to Automotive Industries by the car factories

	November 1954	October 1954	November 1953	Eleven Months	
				1954	1953
Hudson	1,772	3,470	5,259	73,547	143,070
Nash	5,464	5,790	8,633	62,801	128,496
Total—American Motors	7,236	9,260	13,892	136,348	271,566
Chrysler	12,284	4,998	11,420	84,099	149,231
De Soto	9,197	2,936	11,167	58,016	119,314
Dodge	24,877	8,285	20,280	119,011	280,188
Plymouth	49,704	14,888	48,205	327,003	613,374
Total—Chrysler Group	96,062	31,067	91,062	588,089	1,162,107
Ford	116,060	39,419	110,961	1,246,199	1,122,456
Lincoln	2,267	1,227	2,405	33,217	37,600
Mercury	10,118	9,906	19,431	231,128	289,494
Total—Ford Group	128,065	41,552	132,797	1,510,544	1,449,550
Buick	46,488	14,637	17,605	477,175	471,432
Cadillac	11,900	3,370	10,050	106,082	96,792
Chevrolet	131,616	72,433	37,219	1,257,792	1,349,248
Oldsmobile	36,657	20,968	24,961	390,758	309,448
Pontiac	36,635	31,780	10,466	322,370	380,743
Total—G. M. Group	263,000	143,188	106,301	2,557,187	2,610,663
Henry J.			1,071		7,437
Kaiser		None	70	5,409	19,394
Willys	540	243	None	10,277	42,770
Total—Kaiser Motors	540	243	1,141	15,686	69,601
Packard	232	None	782	25,482	75,979
Studebaker	13,518	11,327	13,612	81,398	175,504
Total—S-P Corp.	13,750	11,327	14,394	76,861	251,483
Total—All Makes	508,653	236,627	361,787	4,864,735	5,614,970



MAMMOTH DIE

What is believed to be the world's largest reinforced plastic draw die is shown forming parts for Beech Aircraft Corp. Built by Tru-Scale, Inc., the die is more than 14 ft long and nearly four ft deep at the deepest end. It tapers to about three ft at the small end. Overall weight of the tool is only 18,000 lb, and weight of the punch is 6000 lb. Press is an 800-ton Lake Erie double-action hydraulic unit with a bed size of 13 ft by eight ft. Plastics used on the die were epoxy resins reinforced with fiber glass, backed up by phenolic resin and mounted on a steel frame. Draw rings and die rails are steel, faced with cast epoxy resins.

Ten-Man Board to Shape Top Policies at AMC

Nash executives dominate the new top policy committee at American Motors Corp., formed by George Romney, president, as part of the company's reorganization program. The new board under Mr. Romney's chairmanship will meet once a week and will establish the overall policies of the company within the general corporate decisions made by the board.

In addition to John L. Brown, B. A. Chapman, Edward L. Cushman, and William H. McGaughey, whose names were announced earlier, the policy committee will consist of: E. W. Bernitt, vice-president in charge of manufacturing and procurement for the Automotive Div.; Charles T. Lawson, executive vice-president in charge of the Appliance Div.; Howard A. Lewis, vice-president in charge of finance and general manager of the Export and Subsidiary Div.; Meade F. Moore, vice-president in charge of research and engineering for the Automotive Div.; and J. J. Timpy, vice-president.

Formation of the top policy committee was the first major change at AMC under Romney's command. Another move which followed almost immediately under the new president resulted in the creation of four new marketing divisions.

Kaiser-Willys Cuts Prices On Two New 1955 Car Models

By means of a closed-circuit television broadcast, Kaiser-Willys introduced to its dealer body on Dec. 8 the company's 1955 passenger cars, restyled Jeep, and other four-wheel-drive utility vehicles. The new automobiles are scheduled for public display on Jan. 6.

A new hardtop model, the Willys Bermuda, will replace the 1954 Eagle. It will sell for an advertised delivered price of \$1795, a cut of some \$400.

The Willys Custom, a new four-door sedan, replaces last year's Ace model. It has an advertised delivered price of \$1725, a reduction of about \$300. Retained in the line for 1955 is the Kaiser Manhattan. Its price will remain unchanged.

AND AVIATION INDUSTRIES

Record Number of Craft On Display at Boat Show

The biggest fleet in the history of the National Motor Boat Show—380 recreational craft of all types—will be on display at the 1955 edition of the annual event. It will be held at the Kingsbridge Armory in New York, Jan. 14 to 23.

The exhibits of 70 boat builders and distributors will include 28 inboard cruisers from 22 to upward of 50 ft, 20 outboard cruisers, 28 inboard runabouts, 24 sailboats from eight to 40 ft in length, 225 outboard runabouts, and 55 assorted dinghies, prams, canoes and rowboats. The displays of 29 inboard and outboard engine manufacturers and 134 accessory companies will round out the exposition.

Mercury Cuts Prices On Four 1955 Models

Mercury has reduced the prices on four of its 1955 car models from \$8 to \$10 and increased two models \$31. Further adjustment in freight charges announced by Ford Motor Co. in October results in lower shipping costs for Mercury cars to distant points.

The maximum freight charge for all series of Mercury cars is now \$165, about a \$45 reduction from the previous charge. Mercury also fell in line with other car companies in cutting prices on some equipment. Power steering has been reduced to \$100, about \$30 under the former list price, and the radio is down \$9 to \$89.50.

MERCURY PRICES*

Custom	1955	1954
Two-door sedan	\$2,015	\$2,025
Four-door sedan	2,070	2,078
Sport coupe	2,130	2,138
Station wagon	2,450	....
Monterey		
Four-door sedan	2,185	2,154
Hardtop coupe	2,245	2,265
Station wagon	2,597	2,566
Montclair		
Hardtop coupe	2,400	....
Sun Valley	2,475	....
Convertible	2,475	....

* Suggested list prices, which do not include Federal excise tax and handling charges.

14,000-16,000 G.V.W. TRUCKS UP IN 10 MONTHS OVER 1953 1954 U. S. Motor Vehicle Factory Sales*

	Passenger Cars	Trucks	Buses	Totals	
				1954	1953
January	454,562	96,167	408	551,134	564,470
February	446,676	87,141	328	534,145	582,290
March	531,529	101,177	297	633,003	700,439
April	534,667	96,723	370	631,760	722,675
May	497,062	91,226	274	588,562	642,132
June	507,055	91,470	351	598,876	660,131
July	451,663	78,507	246	530,416	702,899
August	445,306	75,635	309	521,250	614,656
September	300,998	68,618	326	369,942	574,631
October	221,195	65,965	397	287,557	621,266
Total—Ten Months	4,390,713	852,829	3,312	5,246,854	6,385,920

1954 U. S. Motor Truck Factory Sales By GVW*

	5,000 lb. and less	5,001-10,000	10,001-14,000	14,001-16,000	16,001-19,500	19,501-26,000	Over 26,000	Total
January	45,560	17,492	3,608	17,735	3,658	4,766	3,348	96,167
February	39,373	16,210	3,207	15,656	3,915	5,446	3,331	87,141
March	45,586	18,841	3,719	19,446	4,358	6,322	3,903	101,177
April	43,187	18,023	3,755	18,996	4,017	5,074	3,671	96,723
May	41,950	16,995	3,329	16,955	3,812	4,612	3,670	91,226
June	42,766	15,936	3,464	18,021	4,264	3,726	3,253	91,470
July	37,470	13,558	2,269	16,714	3,103	2,430	2,943	78,507
August	35,395	12,744	2,735	15,292	3,986	2,381	3,302	75,635
September	31,732	12,919	2,576	11,964	3,549	2,589	3,249	68,618
October	29,799	11,865	2,158	12,472	4,215	2,324	3,142	65,965
Total—10 Mos. 1954	392,850	154,483	31,040	162,274	38,897	38,673	33,812	852,829
Total—10 Mos. 1953	484,222	181,480	40,604	156,356	43,674	75,663	41,826	1,033,844

*—Automobile Manufacturers Association.

GM Booklet Describes Jobs In Automotive Retailing

A new booklet being distributed by General Motors describes job opportunities for young people wishing to enter the automotive retail business. Called "Key to Careers in the Retail Automotive Business," the 37-page booklet was produced by GM as an additional step in the corporation's program to encourage high school graduates to enter this field.

Applications of Magnesium Stressed at Recent Meeting

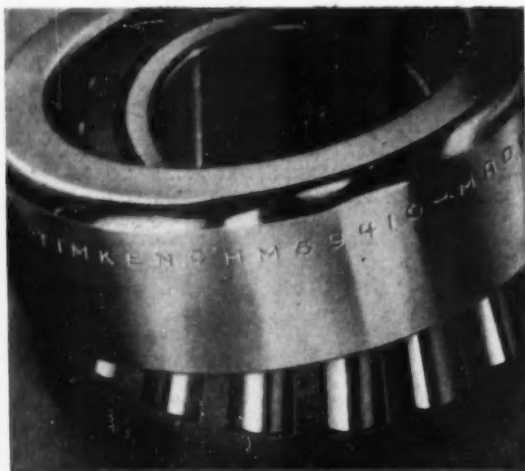
More than 350 persons interested in magnesium and its uses attended the 10th Annual Meeting of The Magnesium Association held last month in St. Louis, Mo. The third day of the session was devoted to a plant visit to the Madison Div. of The Dow Chemical Co., site of what is said to be the largest magnesium rolling mill in the world. Other sessions were given over to a series of technical presentations on working with and finishing of magnesium.

Highlight of the technical sessions was a paper presented by A. J. Bell, Johns Hopkins University, which discussed "Magnesium in the Design and Construction of Guided Missiles." The information brought to the group by Mr. Bell pointed up the tremendous potential ahead in this field of application. A luncheon address by Frank Nichols, president of Nichols Wire and Aluminum Co., focused attention on the importance of light metals in defense work.

Other talks of particular interest to the automotive field were those on commercial electroplating of magnesium, hot chamber magnesium die casting, and recently developed anodized coatings for magnesium.

D. T. Wellman, president of Wellman Bronze & Aluminum Co., was elected president of The Magnesium Association. James E. Pepall, president, Magnesium Co. of Canada, Ltd., was elected vice-president, and J. V. Cosman, president, Superior Bearing Bronze Co., was re-elected treasurer.

Continued on Page 104



WHENEVER YOU SEE the number HM89410 on the cup—and HM89446 on the cone—you're sure the tapered roller bearing is a certain size commonly used on pinions. But when you also see the trademark "Timken", you can feel it's your lucky number. You're getting extra quality and service.

THIS IS YOUR LUCKY NUMBER



HER JOB IS NEAR PERFECTION. She uses this machine to measure bore size and roundness of Timken bearing cones in ten-thousandths of an inch. Cones are then sorted into sub-sizes by O. D. and matched with rollers that have also been sub-sized. It's this precision manufacture that pays off in longer life, less maintenance.



QUALITY CONTROL YOU CAN'T GET ELSEWHERE. To control Timken® bearing quality every step of the way—from melt shop through final inspection—we make our own steel. No other U.S. bearing manufacturer does. Produced in nine huge electric furnaces, Timken bearing steel is the finest made.



WHAT'S AHEAD? This machine studies the effects of vibration on bearings. It's part of our program to make bearings last even longer. When you specify a bearing number, always specify "Timken", too. And for full value, always use a Timken bearing cone with a Timken bearing cup. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

TIMKEN is number 1 for VALUE where value counts most . . . in the vital zone

TRADE MARK REG. U. S. PAT. OFF.

NOT JUST A BALL  NOT JUST A ROLLER  THE TIMKEN TAPERED ROLLER  BEARING TAKES RADIAL  AND THRUST  LOADS OR ANY COMBINATION 

Men in the News



Cleveland Welding Co.—Samuel S. Auchincloss has been named president.



Bendix Aviation Corp.—A. P. Fontaine has been appointed director of engineering, and Dr. A. C. Hall was named general manager of the Research Laboratories for the corporation.



Chrysler Corp., Export Div.—Clarence A. Kelso was named advertising manager.



Studebaker-Packard Corp., Export Div.—R. A. Hutchinson has been placed in charge.

Hudson Special Products Div., American Motors Corp.—Stuart G. Baits has been made general manager; J. W. Eskridge, vice-president in charge of manufacturing; and J. F. Jones, vice-president in charge of sales.

Bulldog Electric Products Co.—Parker H. Stough has been appointed advertising and sales promotion manager.

Dana Corp.—D. D. Robertson and J. R. Miller have been appointed vice-presidents.

American Motors Corp.—William H. McGaughey has been named director of communications and management development.

Stewart-Warner Corp.—Alexander Kidd was elected a vice-president.

White Motor Co. of Canada, Ltd.—Henry J. Nave has been elected president, succeeding L. M. Hart, who will continue as a director. Karl A. Roesch was named director of service.

Babcock & Wilcox Co., Boiler Div.—George W. Kessler has been named chief engineer.

Esso Export Corp.—George H. Freyermuth has been elected executive vice-president and a director.

Lamson & Sessions Co.—James G. Rayburn is now general sales manager.

Simmonds Aeroaccessories, Inc.—Myron G. Domsitz has been appointed chief engineer.



Cadillac Motor Car Div., General Motors Corp.—J. H. Lamb was named manager of purchases.



Timken Roller Bearing Co.—J. Frank Corbin has been appointed traffic manager.

Necrology

Clyde V. Cessna, 74, founder of the aircraft company bearing his name, died Nov. 20, at Rago, Kans.

H. Winfield Chapin, 86, former president of Brown-Lipe-Chapin Div. of General Motors Corp., died Nov. 18, at Syracuse, N. Y.

Lawrence W. Hance, 62, retired assistant vice-president of Baldwin-Lima-Hamilton Corp., died Nov. 27, at Philadelphia, Pa.

Harold D. Steinbright, 56, secretary of American Chemical Paint Co., died Nov. 20, at Norristown, Pa.

Clifford S. Anderson, 76, advisory counsel for Norton Co., died Nov. 10, at Worcester, Mass.

Alfred B. Eissler, 57, Michigan-Ohio-Indiana sales manager for Studebaker-Packard Corp., was killed in an automobile accident Nov. 19, near Albion, Mich.

Fred S. Hartman, 81, retired general manager of the Industrial Dept. of General Electric Co., died Nov. 18, at Verona, N. J.

W. R. Turnbull, 84, an inventor of the variable-pitch propeller and aeronautical pioneer, died Nov. 26, at Saint John, N. B.

George B. Flood, 74, former treasurer and director of Sprague Electric Co., died Nov. 21, at North Adams, Mass.

Herbert S. Powell, 71, founder of the muffler company bearing his name, died Nov. 14, at Utica, N. Y.

Fred H. Johnson, 58, president of Progressive Welder Co., died Nov. 2, at Detroit, Mich.

Eaton Offers 5 Methods of Increasing Valve Life



Eatonite-Faced Valves

Eatonite—heat resistant, corrosion resistant, wear resistant—applied to valves by a special Eaton-developed process adds materially to valve life in commercial vehicles and in heavy-duty industrial engines. Available as solid valves, hollow sodium-cooled valves, or free-valves.



Eaton Sodium Cooled Valves

Eaton Sodium Cooled Valves run cooler, last longer, maintain a high level of engine output and economy. They ordinarily require no attention between engine overhauls; keep trucks on the job; pay for themselves many times over.

Eaton Free-Valves

Freedom to turn in either direction prevents formation of stem and uneven seat deposits; prevents sticking and scuffing; prevents valve burning and guttering; effects an appreciable increase in valve life. Eaton Free-Valves can be applied to engines of all types and sizes without costly design changes.

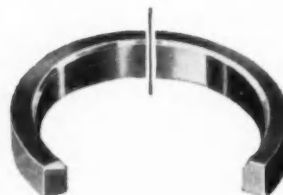
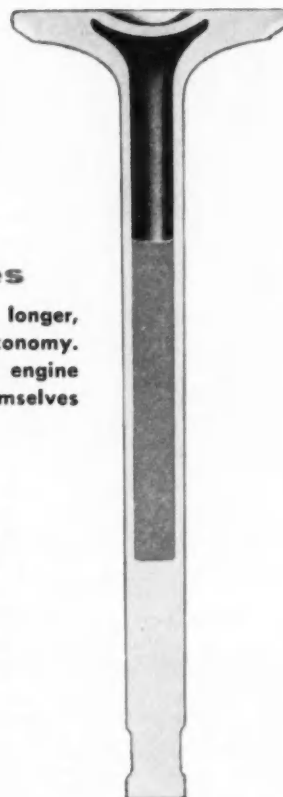


Eaton Hydraulic Valve Lifters

Eaton Zero-Lash Hydraulic Valve Lifters maintain zero valve clearance at all temperatures, and under all operating conditions; improve valve seating; prevent valves pounding into seats. Available in all types and in all materials, including heat-treated steel, hardenable iron, chilled-face, and puddled-face.

Eatonite Valve Seat Inserts

Valve seat inserts of Eatonite—heat resistant, corrosion resistant, wear resistant—reduce valve failure caused by prolonged operation at excessive temperatures and maintain a high level of engine output. Available for all types of engines.



EATON

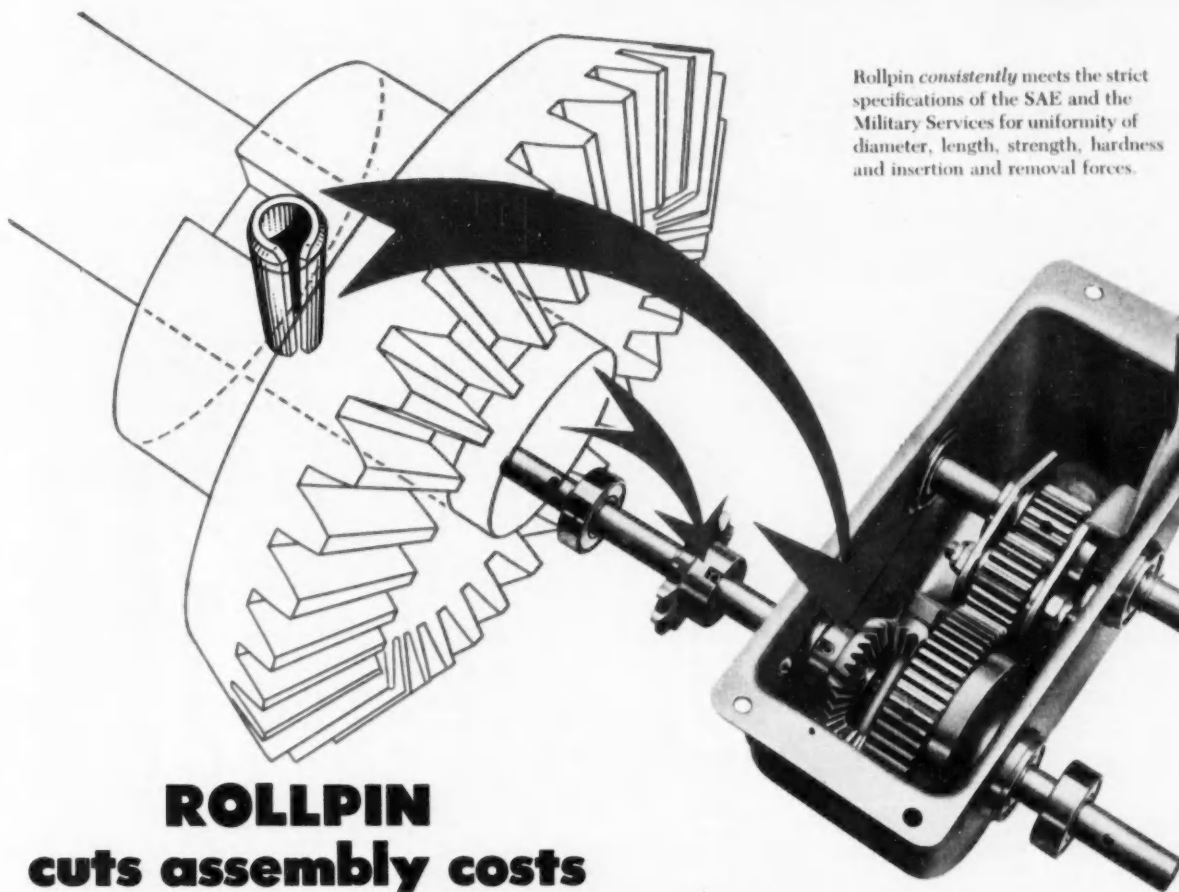
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General Offices: CLEVELAND, OHIO

VALVE AND SAGINAW DIVISIONS: 9771 FRENCH ROAD • DETROIT 13, MICHIGAN



PRODUCTS: Sodium Cooled, Poppet, and Free Valves * Tappets * Hydraulic Valve Lifters * Valve Seat Inserts * Jet Engine Parts * Rotor Pumps * Motor Truck Axles * Permanent Mold Gray Iron Castings * Heater-Defroster Units * Snap Rings * Springlites * Spring Washers * Cold Drawn Steel * Stampings * Leaf and Coil Springs * Dynamatic Drives, Brakes, Dynamometers



Rollpin consistently meets the strict specifications of the SAE and the Military Services for uniformity of diameter, length, strength, hardness and insertion and removal forces.

ROLLPIN cuts assembly costs on new "acre an hour" power mower

... and solves tough vibration problem!

No extra parts—fewer assembly operations—better performance under vibration! Western Tool & Stamping gained these advantages by switching to Rollpin fasteners for its popular new Homko mower.

WT&S uses Rollpin fasteners in the transmission gear assembly, in the two jackshaft bracket assemblies, and in the extension bar that connects power unit to mower assembly. Why? Because, with Rollpin, there's no precision drilling, threading, or peening. And there's no need for cotter pins or other locking devices.

Rollpin is a slotted, tubular steel spring pin with chamfered ends that drive easily into standard holes, compressing as driven. Its spring action locks it in place despite severe vibration, impact loading, or stress reversals. Rollpin is readily removable and can be re-used in the same hole.

Mail the coupon for information on how Rollpin can do your fastening jobs faster and more economically.



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Dept. R31-125, Elastic Stop Nut Corporation of America
2330 Vauxhall Road, Union, New Jersey

Please send the following free fastening information:

- ☐ Rollpin samples ☐ Here is a drawing of our product.
☐ Rollpin bulletin What self-locking fastener would
you suggest?

Name _____ Title _____

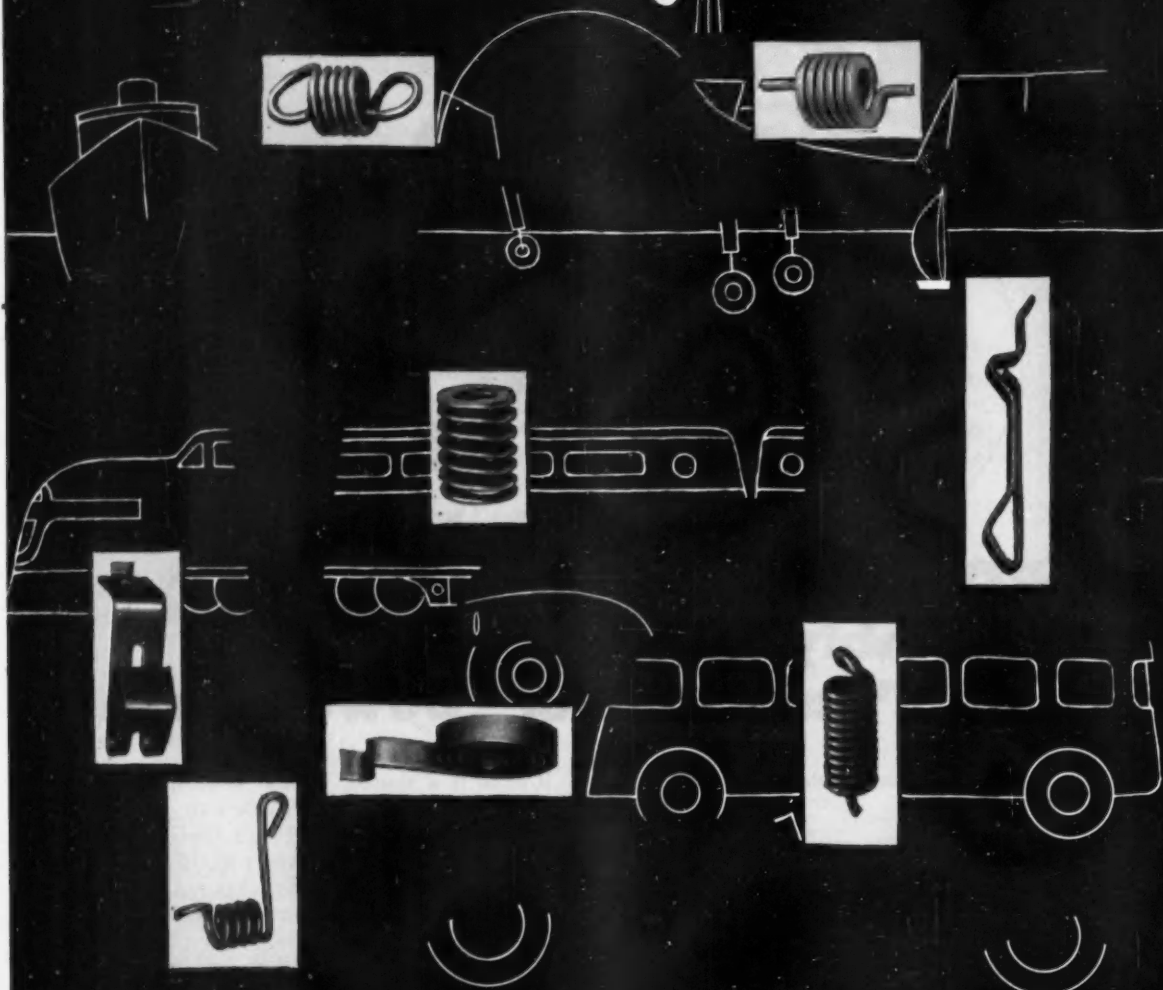
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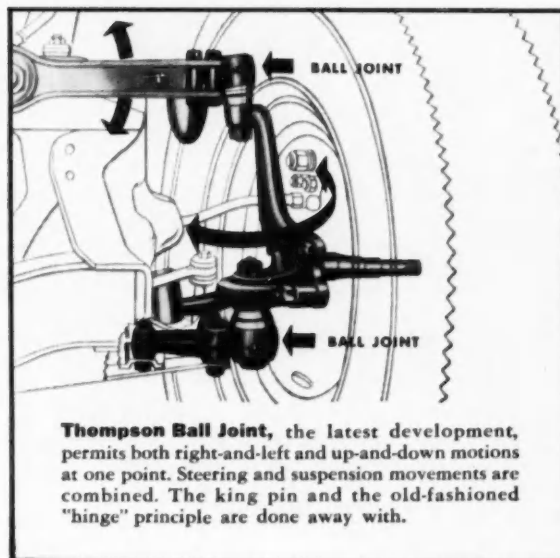
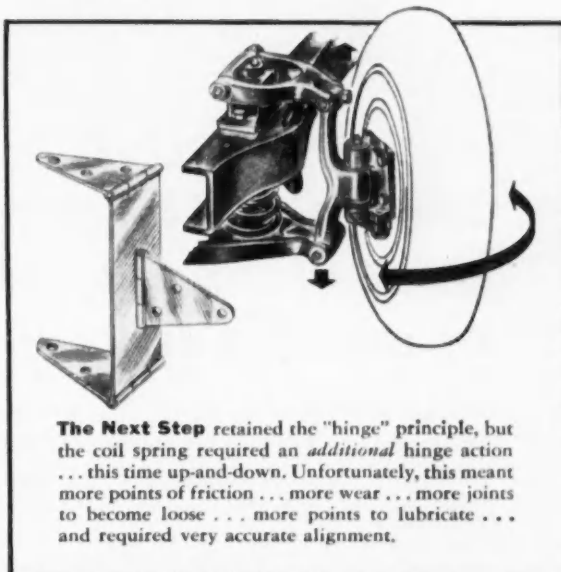
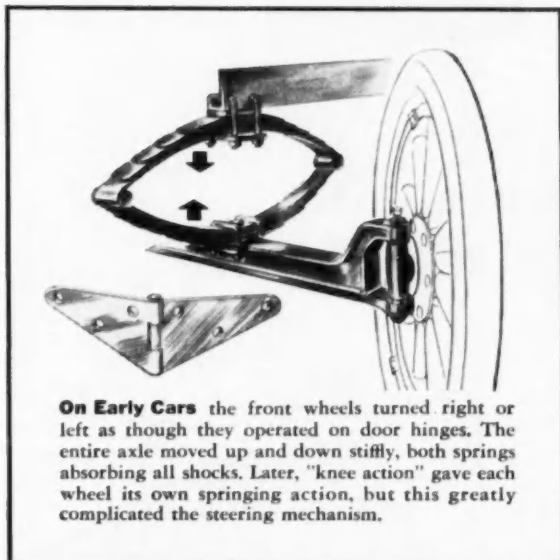
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IT WILL HUG THE ROAD BETTER, STEER EASIER, RIDE SMOOTHER
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LEADING CAR MAKERS ARE NOW USING this highly efficient ball joint for front wheel suspension. *Why not consider it for your car?* Ball joints are typical of the many improvements developed by Thompson Products. For more than half a century, Thompson has been a leading producer of automotive chassis parts ... including drag links, tie rods, tie rod ends, complete steering linkage units and many others. Bring *all* your steering linkage problems to Thompson's experienced engineers. Write, phone or wire Thompson Products, Inc., Michigan Division, 7881 Conant Avenue, Detroit 11, Michigan, WA 1-5010.

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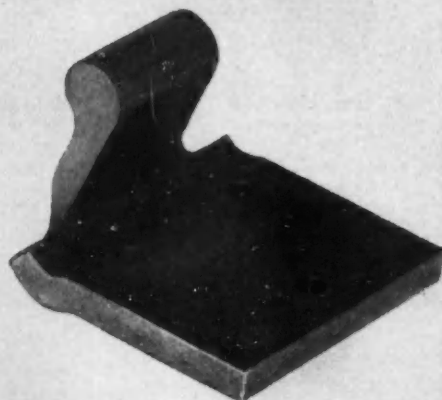
LOWER COST per piece with continuous SURFACE BROACHING of small parts...

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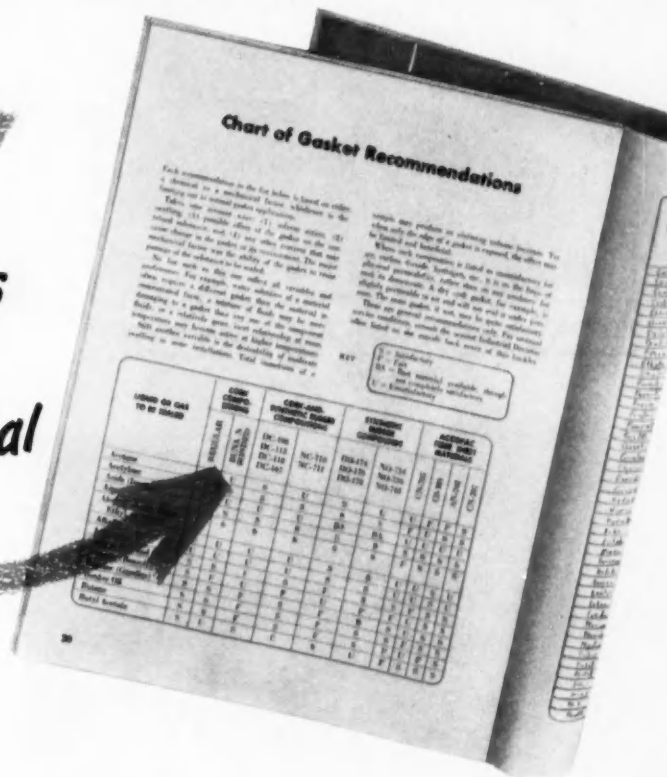
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What Armstrong Gasket Materials are best for sealing specific fluids?

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When you want to find the right gasket materials for sealing specific liquids or gases, or when you want to find a gasket material made to meet current SAE-ASTM specs, you can find the data you're looking for in "Armstrong Gasket Materials." This 24-page manual is revised annually to provide the latest information on gasket design. It includes details of various types of Armstrong Gasket Materials as well as hard-to-find data on designing flanges and joints. See it in Sweet's product design file—or write for free copy. **Be sure to specify Armstrong Gasket Materials when you order from your gasket fabricator.**



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Ray Crawford, who won in the large stock car class in a Lincoln, is shown at the finish line of the third lap. International News photo



Umberto Maglioli of Italy won the heavy sports car class in this Ferrari. International News photo

PREPARATION, co-ordination and maintenance on the road were given as the formula by many drivers as the chief reason for 86 out of a starting field of 151 cars completing the rugged five-day Pan American road race starting at Tuxtla Gutierrez, Mexico, Nov. 19. In 1953 the starting field had 177 cars and 55 of the light and heavy sport and stock cars completed the run to the finish line at Juarez, Mexico, across the Rio Grande River from El Paso, Tex.

For the third consecutive year, the Ford Motor Co. went all out to prove its Lincoln automobiles.

On hand to watch the nation's leading drivers cross the finish line November 23 was Benson Ford, vice-

CIUDAD JUAREZ, MEXICO

Higher Percentage in Grueling

Special Dispatch to
AUTOMOTIVE INDUSTRIES

By Charles Amador

president and general manager, Lincoln-Mercury Div. of the Ford Motor Co. The Pan American Road Race, Mr. Ford said, represents a part of the proving ground for Lincoln automobiles.

The Lincoln team was more in evidence than any other, and for a good reason. There were from 40 to 50 Lincoln men at the finish line. Fourteen Lincolns had started the run and four finished. They had a starting lineup featuring such track aces as Bill Vukovich, Jack McGrath, Johnny Mantz and others, including Chuck Stevenson who won the race two years in a row. Most of the Lincoln cars were involved in accidents, crashing into mountain gullies or rolling over shoulders of tricky curves. Mechanical difficulties occurred chiefly in transmissions.

Jim Cassidy and other drivers complained that the poor octane quality of Mexican gasoline, which had to be used by cars, caused broken piston heads. Cassidy said detonation was noted at

starting lines after cars had been tuned to perfection on U. S. gasoline. Other drivers said they did not notice any great difference with the use of Mexican fuel.

Among the 24 cars out of the race the first day were Ferraris, Kurtis Krafts, Lincolns, Buicks, Fords, Dodges, Alfa Romeos, a single Chrysler and stock Chevrolets plus a Corvette were knocked out the first day. Most of the mechanical failures were due to transmission failures over the mountainous climbs and use of gears for braking.

Brakes wore rapidly due to excessive speed, however, mechanical crews changed brake shoes daily.

Tommy Drisdale, who finished first in the light

of Cars Finish Mexican Race

stock division, said "Team effort won the race for us." He credited better road conditions this year for the high number of cars finishing in contrast to other Pan American races.

Rules were different this year from the other four previous races. Following are the major rule changes:

Official regulations permitted boring of cylinders of stock cars up to 0.020 in. over their standard diameter. Race technicians disqualified some of the cars at the starting line when it was determined they had bored too much over the standard diameter.

On the stock cars, few modifications were permitted. Most of the cars were strictly stock vehicles. Contestants were cautioned repeatedly with the following warning: "No alterations or modifications of any nature will be authorized during the race under penalty of disqualification."

Racers from 13 nations were permitted to modify lighting equipment, make of brakelining, brand of tires and mounting system, brand and type of spark plugs and ignition coil.

Many drivers used a "hot" or large coil; however, officials stopped them with announcement that the large coil would be permitted but no change could be made in the stock condenser used. Drivers had to switch at the last minute back to the stock coil and condenser.

Other modifications permitted were with batteries, provided the voltage and capacity of the new battery was not greater than the original type.

On carburetors, the only changes permitted were with the jets and nozzle tubes. "The type and make of the carburetors will be the same as indicated in the homologation report to the international federation," the rules specified.

Participants had to declare the gear ratios before the start of the race and keep them throughout or be disqualified. Ratios were confined to those offered as stock or optional equipment.

All contestants had to present a technical report on modifications made to the car before they were allowed to start. Inspections were held three days before the



Karl G. Bechem was third in general classification and first in the small sports car class when he wrecked his Borgward sports car. International News photo

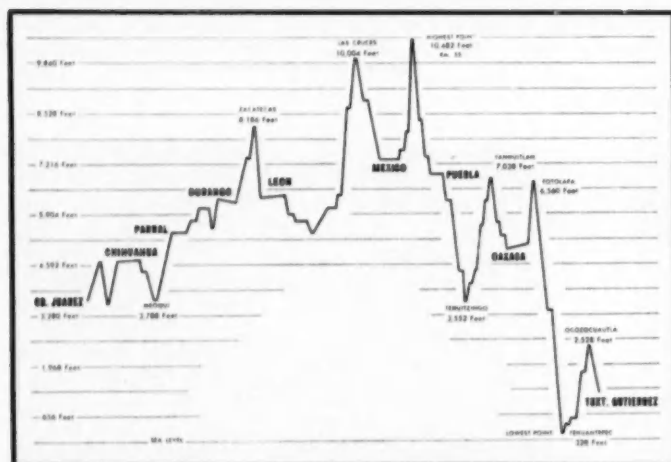
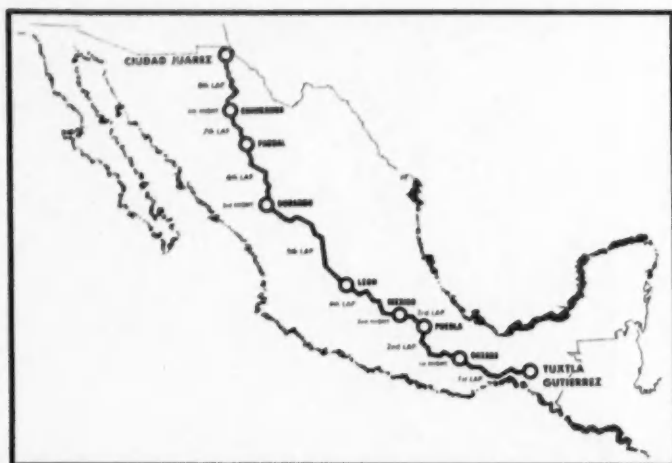


Lincoln No. 117 rolled over but finished race. International News photo

start of the five-day race, Nov. 19. A rule stated, in part, "any alterations or modifications not specifically mentioned will lead to the disqualification of the car."

The International Automobile Federation had declared that permissible changes included crankshaft balancing, wheel balancing and reinforcement of the interior of the body for safety reasons.

Also included in permissible changes were rein-



Official Route and Altitude Chart for the 5th Pan American Road Race
Courtesy Compania Comercial Vacuum, S.A.

forcement of the hood lock, removal of the rear seat to install an extra gasoline tank or to carry extra parts. The extra tank had to have one or more vent pipes with outlets leading to the rear of the car.

Contestants were permitted to "remove the muffler and extend the exhaust pipe to the rear of the car, or the side, 10 to 50 cm. behind the back part of the front door, without cutting through the car body or altering in any way the original diameter of the exhaust pipe or the exhaust manifolds."

Drivers and mechanical crews in the heavy stock, light sports and European stock cars had only one hour to work on their cars after the vehicle crossed the finish line of the day's running. Only heavy sport cars were excluded from this regulation. Failure to have the car in designated impound areas each night during the Nov. 19-23 run called for immediate disqualification.

Cars were clocked from the moment of arrival at the finish line until arrival at the impound area. Officials were strictly enforcing this rule, disqualifying many entrants who had completed the day's run but

spent too much time going over the car.

A list of the winners in each class appeared in the December 1 issue of *AUTOMOTIVE INDUSTRIES*. Following are first five finishers in each of five classes:

UNLIMITED SPORTS CARS

Driver, Country and Make	Total Time
1—Umberto Maglioli, Italy, Ferrari	17:40:26
2—Phil Hill, Santa Monica, Calif., Ferrari	18:04:50
3—Franco Cornacchia, Italy, Ferrari	19:45:06
4—Luigi Chinetti, Italy, Ferrari	20:10:28
5—Akton Miller, Whittier, Calif., Miller Special	20:21:09

SMALL SPORTS CARS

1—Hans Hermann, Germany, Porsche	19:32:22
2—Jaroslav Juhan, Guatemala, Porsche	19:33:09
3—Luis Chiron, France, Osca	20:34:56
4—Francisco Segura, Argentina, Porsche	20:56:23
5—Lopez Chavez, Mexico, Porsche	22:57:31

U. S. LARGE STOCK CARS

1—Ray Crawford, Pasadena, Calif., Lincoln	20:40:19
2—Walt Faulkner, Long Beach, Calif., Lincoln	20:42:07
3—Keith Andrews, Denver, Cadillac	20:43:14
4—Edward Stringer, Pueblo, Colo., Cadillac	21:15:13
5—Luis Leal Solares, Mexico, Buick	21:51:17

U. S. SMALL STOCK CARS

1—Tommy Drisdale, El Paso, Dodge	22:35:53
2—C. D. Evans, El Paso, Dodge	22:50:44
3—Ray Elliott, Portland, Ore., Dodge	22:52:16
4—Alvarez Tostalo, Mexico, Dodge	23:00:18
5—Scott Yantis, La Mesa, N. Y., Studebaker	23:02:04

EUROPEAN STOCK CARS

1—Gonsalvo Sanesi, Italy, Alfa Romeo	21:50:42
2—Sergio Mantovani, Italy, Alfa Romeo	22:06:25
3—Maria Dalla Favera, Italy, Alfa Romeo	22:06:50
4—Piero Carini, Italy, Alfa Romeo	22:19:54
5—Adolfo Velazquez, Mexico, Alfa Romeo	23:00:57

Details of Chevrolet's Air Conditioning

and Power Steering Systems

SHOWN here are the new air conditioning and power steering options offered by Chevrolet for 1955.

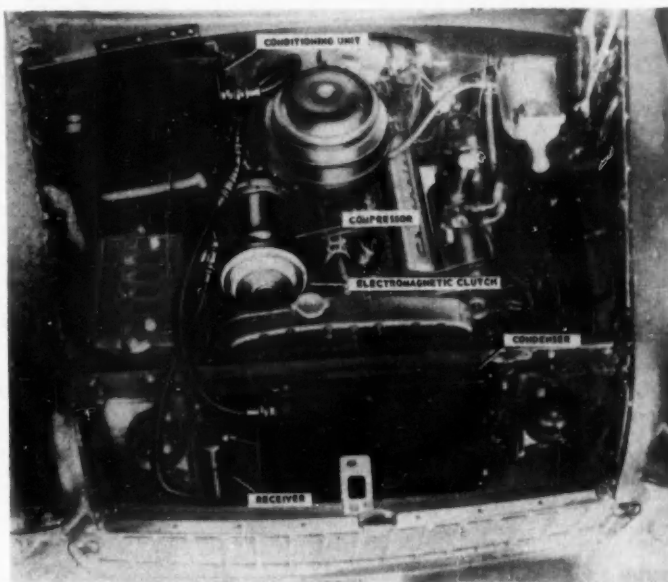
Linkage type power steering now replaces the integral type used previously. The steering column assembly differs from that used in the conventional steering system only in that the Pitman arm is longer. This reduces the overall ratio to 23.1-to-1 from the 25.7-to-1 ratio in the conventional system.

The hydraulic control valve operates in basically the same way as in the previous design to determine and direct the correct measure of assistance required to keep driver steering effort within set limits. These limits remain unchanged with assistance starting at approximately three pounds steering wheel rim pull and reaching a maximum of 81 per cent assistance with about eight pounds steering wheel rim pull. To do this, the control valve is positioned in the steering system as a functioning part, but with sufficient spring loaded travel to actuate the valve when human effort required is more than predetermined minimum.

A vane-type hydraulic pressure supply pump similar to the 1954 design is used. However, the new pump mounts on the rear of a special generator replacing the production generator, and is driven by a splined extension of the armature shaft. A hydraulic fluid reservoir concentrically surrounds the pump to complete the hydraulic pressure supply system.

The complete, all-weather air conditioning system which is available on all passenger cars equipped with the V-8 engine, except the convertible, combines cooling, heating, and humidity control. The system operates on outside air with an automatically-varied partial recirculation feature, or entirely on recirculated inside air.

Single unit design eliminates unwarranted duplication of components and permits mounting major assemblies beneath hood and instrument panel.



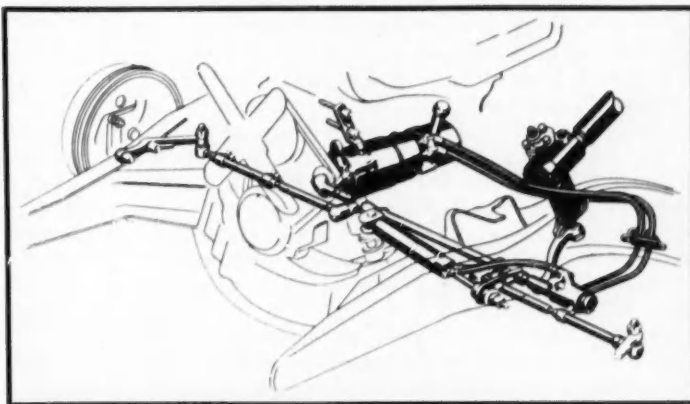
Units of the air conditioning system are located under the hood

Outside air is introduced into the system through the cowl intake and immediately passed through the conditioning unit, an insulated housing containing both the heater core and the cooling coils. A two-speed sirocco blower directs the air to a distributor mounted high on the cowl panel inside the passenger compartment. Conditioned air then enters the passenger compartment through any of three main distribution channels in proportions determined by control settings.

The desired heating capacity is obtained simply by metering the flow of engine coolant through the heater

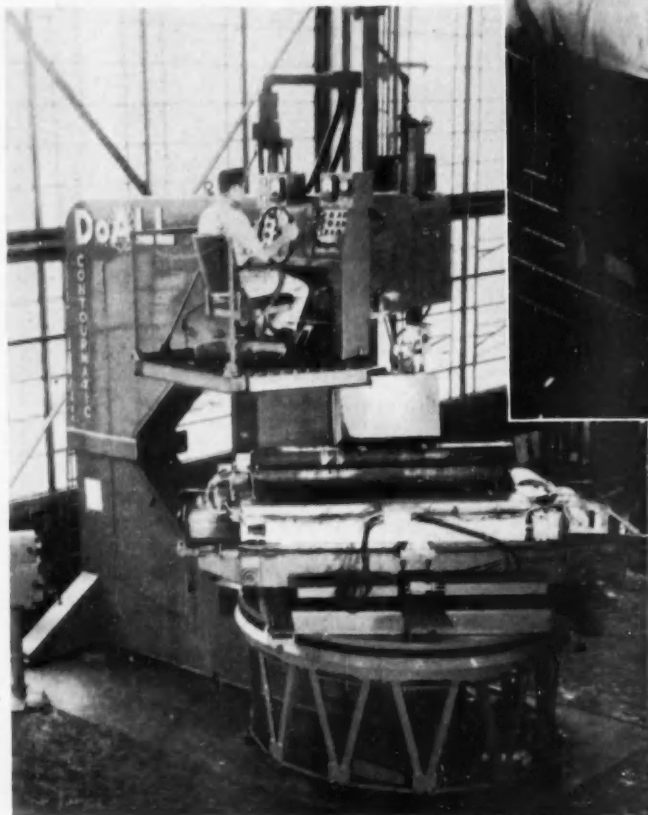
(Turn to page 118, please)

Schematic illustration showing linkage type power steering components



Viewing the cutting action in a periscope-like arrangement of mirrors, the operator, "steers" the work along the designated curved or straight path with a wheel, associated with an electronic control that automatically coordinates the movements of three, vertically-stacked, power-driven tables

Overall view of the world's largest band saw



Machining Huge Sawing and

and capacity, would have to hold as well as guide huge steel die blanks into the saw following contour as well as straight layout lines in producing the die aperture. Such a machine had never been built before.

Obviously, with the standard size band sawing machines and the ordinary feeding devices available it would be impossible for an operator to guide the heavy workpiece with anywhere near the accuracy required for the manufacture of a complex extrusion die. Instead, the enormous dies are guided by remote, automatic controls permitting the narrow saw band to cut directly along the most intricate outlines with the required accuracy.

The sawyer seated in the control station has an intimate closeup of the cutting action through a viewer that uses a periscope-like arrangement of mirrors. By observing the cutting action through the periscope, the sawyer steers the work into the saw

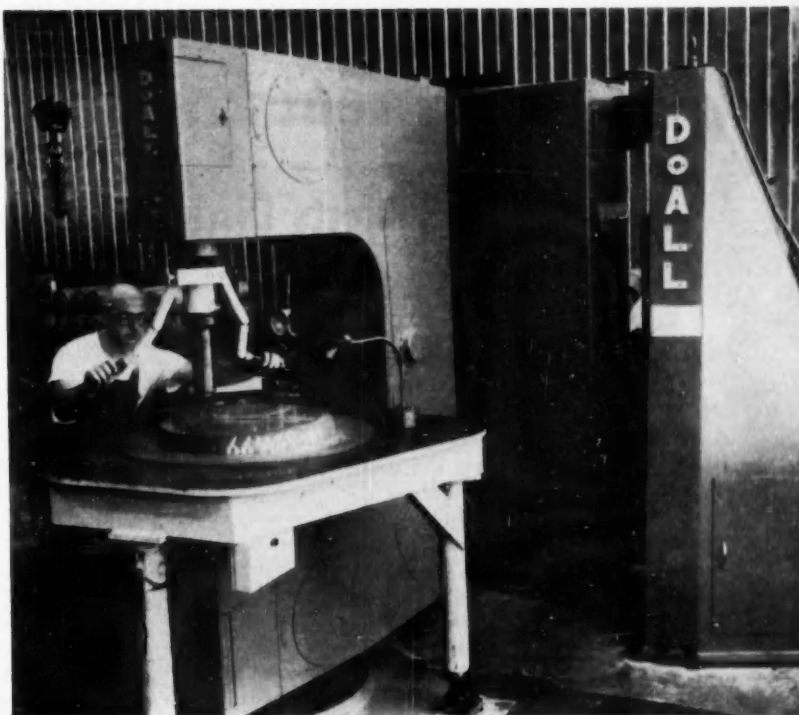
THE operation designated by the Air Force as the Heavy Press Program involves machine tools of great size in addition to giant presses to produce some of the world's largest extruded aluminum shapes.

Press equipment at the Lafayette (Ind.) Works of Aluminum Co. of America was described and illustrated in *AUTOMOTIVE INDUSTRIES*, June 1, 1954. Supplementing the press and stretcher at this facility are two special machine tools for production of the dies used. These are a DoALL Contour-matic band saw and a DoALL die filer.

The construction of a band saw large enough to handle the machining of the huge extrusion dies presented quite a problem as the machine, besides its size

by following any curved or straight layout line with a simple control connected with an "electronic brain" that automatically coordinates the movements of the three vertically stacked, individually motor-driven tables. As a result, the work is always fed directly into the saw on straight cuts or at a tangent to any curve. The control is: "steering wheel," very similar in appearance and arrangement to that used by a pilot in operating an airplane. To move the work into the saw blade the operator pushes the wheel forward. To retract the work he pulls the wheel toward him, and to stop all table motion he centers the control wheel in a central position. To follow a curved line or complete circle the operator turns the control wheel to the right or left as required, which automatically rotates the work to the left or right.

Because the sawyer does not touch the work during the machining operation, he is deprived of



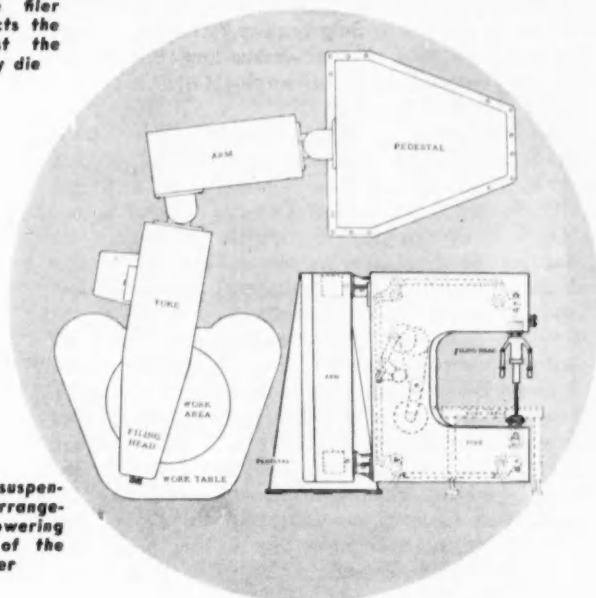
DoALL die filer which directs the file against the stationary die

Dies With Special Filing Equipment

that "sense of feel" for evaluating cutting pressure, ease of cutting, rate of cutting, etc. This is compensated for with an indicating control system using strain gages. Not only is the operator fully informed of the pressure between the work and the saw band, but the system will maintain the pressure at the value set by the operator. Furthermore, there are automatic safety checks which stop all table motion if the cutting and feeding forces become excessive.

Hydraulically-actuated controls are provided for adjusting and maintaining saw band tension, adjusting upper saw guide position, shifting saw speed ranges, varying saw speed within a range, and tilting the three saw band carrier wheels to track the saw band.

After the extrusion dies have been machined on the



Method of suspension and arrangement for powering file head of the die filer

band saw, the die aperture is finished on a DoALL die filer. This filing machine is unique in that the die is not directed against the file, but remains stationary on the work table. Instead, the file is directed against the die, and to do this the operator swings the entire filing head. Little effort is required to do this since the filing frame proper (yoke) is suspended above the floor, floating on hinges associated with an intermediate frame (arm) which in turn is hinged and

(Turn to page 115, please)

Current Engine Problems

Variety of Subjects Discussed at Recent SAE Meetings

By Paul C. Kennedy

ENGINE designers, fuels specialists and commercial vehicle builders and users discussed a number of current problems at three SAE national meetings recently. These included the Fuels and Lubricants, Diesel Engine, and Transportation Meetings, held respectively at Tulsa, Cleveland and Boston. Gum engine deposits, cold starting, and nickel-cadmium batteries received close attention as some of the leading topics at these sessions.

New problems arising from piston ring and cylinder wear were outlined by A. M. Brenneke and M. E. Estey, Perfect Circle Corp., before the F&L group. Although they admitted papers on this subject are "almost in the class of Fourth of July oratory," the authors did have some new data on wear versus low oil consumption. This was taken in split-engine tests on several types of engines in service.

Data from the 1953 Coordinating Research Council automobile antiknock survey were presented in a joint paper by H. W. Best of Yale University, H. A. Bigley of Gulf Research, and R. K. Williams of General Motors Research Laboratories. Part-throttle tests were included for the first time, as one make of automobile had its maximum octane requirement in 95 per cent of the cars tested, at part throttle.

Deposits from both Diesel and gasoline fuels received considerable attention. Results of tests on six automotive Diesels made by Standard Oil Co. (Indiana) were shown by D. S. Gray and H. R. Taliaferro. These pointed to more than doubled ring wear when sulphur was increased from 0.25 to 1.25 per cent, doubled exhaust deposits when aromatics content was increased from 14 to 45 per cent, and 40 per cent exhaust deposit increase when the boiling point was raised 200 F. The spread in the data showed that engine design has a considerable effect on these factors, however.

A laboratory test for evaluating gasolines for induction system gum formation was explained in a paper by C. C. Moore, J. L. Keller, W. L. Kent, and F. S. Liggett of Union Oil Co. of California. Results of the method were said to correlate with actual fleet experiences reported to the company. Another method, the alumina adsorption column technique, was discussed in some detail in a paper by C. R. Bauer, Du Pont.

High speed roller bearing lubrication, using a molybdenum disulfide-air mist, was discussed by Z. N.

Nemeth and W. J. Anderson of Lewis Flight Propulsion Laboratory, NACA. They also reported tests of bearings lubricated with graphite and several liquids, at elevated temperatures.

Static scavenging tests of a two-stroke Diesel, using a pilot sphere, were explained at the Diesel Engine Meeting by W. H. Percival of General Motors Research Laboratories. He uses the sphere to plot axial and tangential velocity components at the mid-plane diameter to find a synthetic efficiency. This method is used in conjunction with flow bench tests of various proposed designs, he said.

A symposium on Diesel cold starting was a highlight of this meeting. Tables showing properties of several fluids used for starting, and their starting effectiveness, were presented by W. G. Ainsley and H. D. Young of Sinclair Research Laboratories. They provided considerable design criteria for an applicator, and discussed one such applicator which is now on the market.

Oil viscosity effects on cranking, as determined in tests on engines at temperatures as low as -65F, were shown in some detail in a paper by J. F. Blose, J. P. Qualey, J. T. Duck and L. G. Schneider of the U. S. Naval Engineering Experiment Station. Details of somewhat similar tests were given in a paper by W. E. Meyer, and J. T. DeCarolus of Pennsylvania State University, and R. L. Stanley of Diesel Engine Manufacturers Association. Facilities available for low temperature testing of engines and vehicles around the country were quite completely cataloged in a paper by P. W. Espenshade, of the Army Corps of Engineers Research and Development Laboratory.

Two papers on supercharging showed work done for possible military applications. Two-stroke investigations, made on a General Motors Model 1-71 single cylinder engine, were reported by H. T. Smith of the Marine Corps. He stated that successful applications of 800-hp Diesels to tracked vehicles might be expected as a result. Tests by W. G. Payne and W. S. Lang at the U. S. Naval Engineering Experiment Station were reported in their paper on supercharging the General Motors 16-278A 1600-hp engine without any extensive or radical changes in the engine.

Some formulas for fixing the weight distribution of tractor-trailer combinations were presented and discussed by M. C. Horrine, consultant to Mack Mfg. Corp., at the Transportation meeting. Other topics

included the GMC two-level intercity bus, portrayed by J. M. Sills of Greyhound Corp. (AUTOMOTIVE INDUSTRIES, Aug. 1, 1954), and a look at International Harvester's new engineering facilities, by P. T. Brantingham (AUTOMOTIVE INDUSTRIES, Oct. 15, 1952).

Details of a line of heavy-duty nickel-cadmium batteries were provided by L. G. Hector, Sonotone Corp. (AUTOMOTIVE INDUSTRIES, Feb. 15, 1954). The author commented that economics probably does not now justify its use in private passenger cars, or even in

many types of commercial vehicles. Low temperature service, and even charging at -40°F , is feasible as the battery will give 60 per cent or more of its rated ampere hour capacity at this temperature. Its ability to supply large currents allows a nickel-cadmium battery of one-half the recommended capacity for the conventional type to be used for engine starting service, he said.

Following are abstracts of three of the many papers presented at the meetings:

The Cause and Correction of Carburetor Gumming

H. W. Sigworth and J. Q. Payne
California Research Corp.

A STUDY of carburetor malfunctioning was made on taxicab fleets in Los Angeles and San Francisco. Rough, rich idling and engine stalling in service vehicles indicated that the principal cause was a deposit in the carburetor throttle body. In most instances the typical deposit was a ring of dry, carbonaceous material on the throttle body wall opposite and below the closed (idle) position of the throttle plate. This carburetor gum deposit restricted the flow of air past the edge of the throttle plate at idle, enriching the mixture to the point where carburetor adjustment became necessary every 5000 to 7000 miles, and cleanup every 15 to 20,000 miles.

The contribution of blow-by was then proved by significant observations and tests. Results showed that: (1) blow-by markedly increases carburetor gumming, accounting for 40 to 60 per cent of contamination; (2) in normal service, an appreciable portion of the blow-by still finds its way into the air intake, causing one-half of the carburetor gum; (3) induction of intake air from outside the engine compartment reduces but does not completely eliminate carburetor gumming, indicating that contaminants other than a car's own blow-by contribute to carburetor gumming; (4) at idle, the air flow through the air cleaner is too low to separate intake air contaminants. Smoke and dust contribute five to 25 per cent and exhaust from other cars five to 40 per cent.

The mechanism of carburetor gumming may be summarized as follows:

Carburetor gumming occurs at idle because: The closed throttle position sets up high velocities around the throttle plate edge, separating entrained materials; blow-by concentration in the underhood atmosphere is at a maximum; the velocities through the air cleaner are apparently too

low to separate the contaminants.

Blow-by is the major source of carburetor gumming, with smoke, dust, and exhaust gas components also contributing. Carburetor gumming causes rough idling and stalling by enriching the mixture or advancing the spark timing at idle. It may also cause a "flat spot." Multiple-throat carburetors are more critical than

single-throat designs because of smaller plate-to-wall throat clearances.

The most effective and economical solution to the carburetor gumming problem is the use of detergent action gasolines which remove carburetor gum deposits during normal vehicle operation.

(Continued next page)

FIG. 1
Effect of detergent action regular grade gasoline on carburetor cleanup in taxicabs

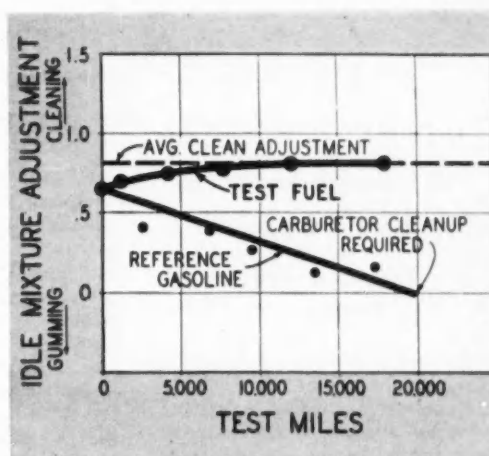
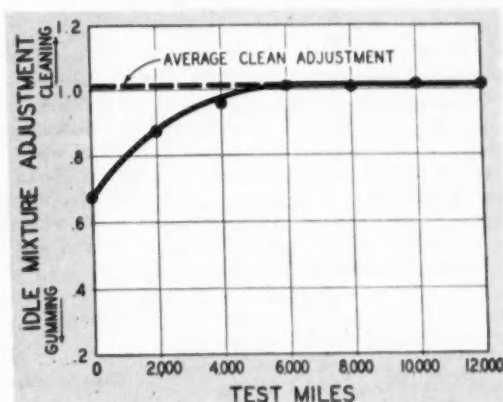
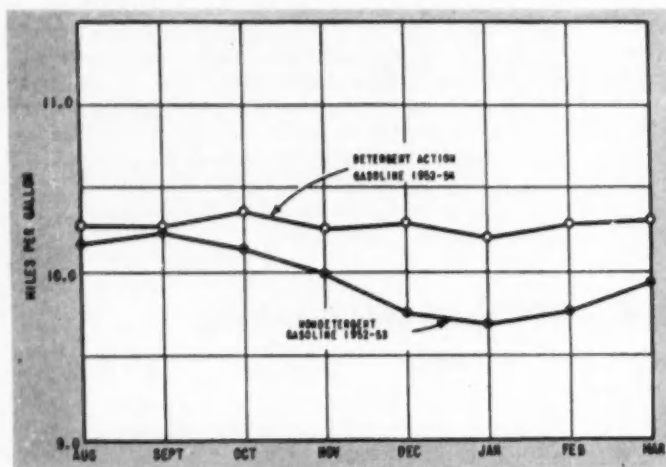


FIG. 2
Effect of detergent action premium grade gasoline on carburetor cleanup on ambulance fleet





Mileage with detergent action gasoline in taxicabs

A "Quick Look" at Engine Combustion

George A. Ball
Ethyl Corp.

THE present study is an investigation of the manner in which inflammation spreads throughout the end gas of an operating engine as determined by high-speed photographs of the combustion process in conjunction with simultaneous pressure records. The high-speed photographs contain both a direct image and a shadowgraph image.

A phenomenon which may play an important role in determining the character of knocking combustion is that of the cool flame. By means of a mechanical stroboscope geared to the engine, visual observations were made of the cool flame. Engine operating conditions were set up for which cool flame radiation was visible, and the time in the engine cycle corresponding to the appearance of the radiation was noted. When the cool flames were subsequently photographed at the same engine operating conditions, identification of the cool flame reaction was positive. Identification of the cool flame reaction from individual frames of the high-speed films is difficult.

The characteristics of the high-speed camera used in this study were such that, at the maximum speed of the camera, three or four successive cycles were recorded on a roll of film when the engine was operated at a speed of 600 rpm. This condition of operation permitted evaluation of

cycle-to-cycle variations while still providing satisfactory photographic definition of the flames under study. However, it should be mentioned that the camera speed is not sufficient to record supersonic disturbances in the combustion chamber. As a result the possible influence of such disturbances must remain somewhat unknown. Examination of the pressure records, on the other hand, shows that the pressure development during combustion correlates well with subsonic phenomena and nowhere is there a virtually discontinuous pressure rise to correspond to a supersonic combustion wave. It is suggested, therefore, that supersonic phenomena are associated primarily with the establishment of acoustic resonance and a true detonation wave does not exist under the test conditions investigated.

The engine used was a CFR crankcase with an L-head conversion block and a special Invar head containing

a quartz window covering virtually the entire combustion chamber.

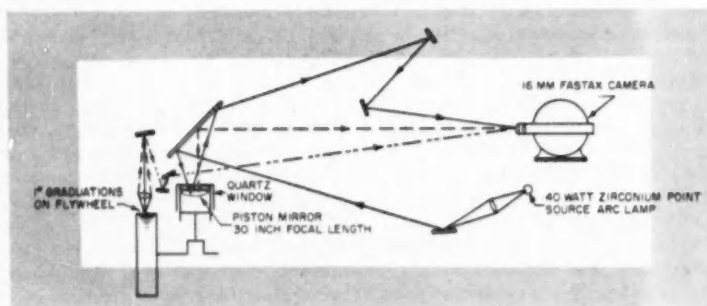
Visual examination of the combustion process through the mechanical stroboscope demonstrated that when the engine was autoigniting on a very lean mixture of n-heptane, a cool flame was produced which was suitable for photographic study. Under these conditions the cool flame is well separated in time from the subsequent "hot" flame so that the two stages of the combustion process are distinct. It was convenient to include the "hot" flame reaction since the heat of the reaction helped maintain the engine temperatures required to stabilize the cool flame. Additional stabilization was achieved by disconnecting the constant speed electrical load on the engine and using only the friction and windage of the induction motor as load. The detailed engine conditions used were as follows:

Engine speed	.....600 rpm (approx.)
Manifold pressure	.....27 in. Hg
Carburetor air temperature	.....80 F
Cylinder jacket coolant temperature	.....190 F
Head coolant temperature	.....50 F
Oil temperature	.....100 F
Ignition	.....None
Air-fuel ratio	.....25:1 (approx.)
Fuel	.....n-heptane
Compression ratio	.....7:1

The cool flame reaction initiates at the valve end of the combustion chamber. Since no spark is occurring in the engine, the onset of the cool flame is presumably due to a local source of heat somewhere in the neighborhood of the valves and the spark plug. The reaction passes across the combustion chamber and terminates at the far end of the chamber over the piston. Following a path similar to the cool flame, the "hot" flame also originates spontaneously in the valve area and travels the length of the chamber. The prominent features of the cool-flame photographs may be summarized as follows:

FIG. 1

Arrangement of optical components for photographing combustion process in engine



1. Confirmation of the existence of the cool-flame reaction in an engine.

2. A demonstration of the possibility of a relatively high rate of propagation for a cool flame.

3. A demonstration of autoignition occurring subsequent to the cool flame.

The engine operating conditions selected for producing knocking combustion are as follows:

Engine speed	.....600 rpm
Manifold pressure	.....29 in. Hg
Carburetor air temperature	.....80 F
Cylinder jacket coolant temperature	.....190 F
Head coolant temperature	.....50 F
Oil temperature	.....100 F
Ignition timing	.....20° bte (approx.)
Air-fuel ratio	.....14:1 (approx.)
Fuel	....90% 2, 2, 4-trimethylpentane + 10% n-heptane
Compression ratio	.....7:1

The major features of the knock photographs can now be summarized as follows:

1. When knock occurs under the operating conditions listed with the stated fuel, a reaction appears in the end gas, distinct from the spark-ignited flame.

2. The reaction consumes the end gas with a moderately high rate.

3. The spark-ignited flame does not accelerate into the end-gas region.

4. No positive evidence of a cool flame appears, but this lack of evidence certainly does not exclude the possibility of the existence of a cool flame.

5. The reaction is accompanied by a rapid rise in cylinder pressure producing an acoustic resonance in the gases.

When the photographs are projected and viewed as a motion picture, there is strongly suggested a sense of coordinated propagation of the spontaneous reaction through the end gas. There are at least two possible interpretations which account for the appearance of the end-gas combustion. One possibility is that the spontaneous reaction propagates with a flame front, similar to the spark-ignited flame. However, this second flame must differ in some essential feature from the spark-ignited flame since the second flame consumes the end gas at a much higher rate.

Precombustion reactions also supply the second possible interpretation of end-gas combustion. At the time when the spontaneous reaction spreads through the end gas, precombustion reactions may have been sufficient to establish a series of ordered individual autoignitions whose order is the result of a temperature gradient in the end gas controlling the precise degree of precombustion at every point. Such a sequence of events would appear

photographically to be a flame propagating, even though every individual element of gas were autoigniting essentially independent of its neighbors. Such a process would have a rate of spreading dependent on the thermal gradient (or precombustion gradient) in the end gas, completely disassociated from the flame speed of a normal flame.

The following description of knocking combustion in an engine has been supported by flame photographs and pressure records. A flame, originated by the spark, proceeds initially across the combustion chamber in a normal fashion. During this time the unburned gases are compressed by the piston and the flame, and precombustion reactions occur. The precombustion reactions proceed until a point

is reached where a spontaneous reaction rapidly spreads through the end gas. The exact mechanism of propagation cannot be determined at present, but it must differ in some essential feature from the mechanism associated with the spark-ignited flame. A steep pressure rise, coinciding in time with the consumption of the end gas, is followed by a period of acoustic resonance producing the sound of knock.

Photographs of cool flames have confirmed their existence in an engine and the propagation of these flames, and the subsequent "hot" flame, appears to be an ordered progression of isolated "autoignitions." It is likely that the factor controlling the rate of spread is the temperature distribution in the combustion chamber.

FIG. 2
Pressure increase
due to cool and
hot flames

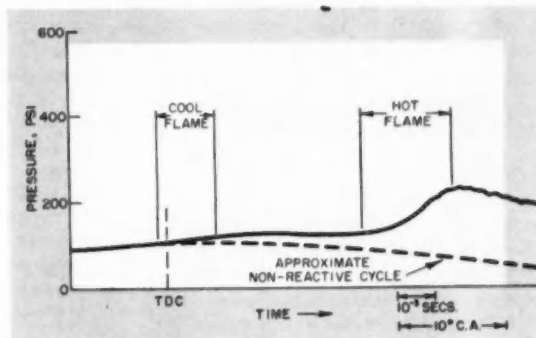
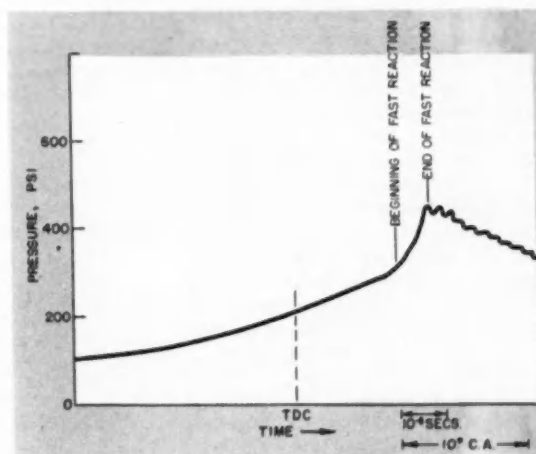


FIG. 3
Pressure trace
showing knocking
combustion



High Supercharging Development of a GM 16-278A Two-Stroke Cycle Diesel Engine

Warren G. Payne and Wolfgang S. Lang
U. S. Naval Engineering Experiment Station

A THEORETICAL analysis indicated that a charging air system of exhaust-driven turbocharger,

engine-driven Roots-type blower, and aftercooler would permit increasing the output of the General Motors,

Model 16-278A two-stroke cycle, Diesel engine from 1600 to 3000 bhp at 750 rpm. Using a mechanism to control engine compression ratio relative to engine output would further improve thermal efficiency at lower loads. Tests with a simulated turbocharged installation proved the accuracy of the analysis. Thermal efficiency from 1500 to 3000 bhp was better than that at the original 1600 bhp rating. Tests are now underway adapting turbochargers to the engine and developing manifolding to duplicate the simulated turbocharged operation.

An analysis was made both for an engine operating with standard fixed exhaust valve timing and for an engine with exhaust valve timing controlled to make the effective piston compression stroke vary with the load carried. Both the rated 750 rpm and an overspeed 1000 rpm were considered. The air flow system included:

1. Conventional engine.
2. Conventional engine with larger mechanical blowers.
3. Lower compression ratios, large mechanical blowers.
4. Lower compression ratios, turbocharger only.
5. Conventional engine with standard blower 1st stage, turbo 2nd stage.
6. Lower compression ratios, standard blower 1st stage, turbo 2nd stage.
7. Conventional engine with turbo 1st stage, standard blower 2nd stage.
8. Lower compression ratio, turbo 1st stage, standard blower 2nd stage.
9. Snorkel conditions with lower compression ratio, turbo 1st stage, standard blower 2nd stage.
10. Use of intercoolers, aftercoolers, and various charging conditions to make a total of 37 combinations.

An air system of exhaust driven turbocharger as a first stage, engine-driven blower as second stage, and aftercooler, with an airbox temperature of 100 F, was the one selected for the first test work. This permitted full utilization of the exhaust energy for pressure boost. Since the engine-driven blower was then supercharged and used only for the pressure boost it would provide, its driving power remained reasonably low. With that arrangement, a predicted output of about 3000 bhp was available with a net thermal efficiency one to two per cent better than at the original 1600 bhp rating. Also, it could be done with operating conditions which should still provide satisfactory mechanical reliability.

In this project, the application of

the turbocharger was divided into two phases to reduce the complicating factors. For the first phase, the turbocharger action was simulated and tests were made to determine the engine operating characteristics. These requirements were used as specifications for procurement of the turbochargers and as a standard during design of manifolding and matching of turbochargers during a subsequent phase.

The simulated turbocharger installations included a valve in the exhaust line to give exhaust back pressures in the ranges that would be caused by current turbochargers. Exhaust line pressure restriction after the valve was the standard 40-in. H₂O. A motor-driven variable speed Roots-type blower was installed in the intake air line as a first stage compressor to take the place of the turbocharger compressor. Valves were installed in the air ducts and after the aftercooler so that the pressure drop would approximate that of the proposed final installation. A salt-water cooled, tubular, aftercooler was used. The standard, water-cooled, engine exhaust manifold was retained in use. The only engine change made for the first tests was installation of fuel injector plungers with 57 per cent additional capacity and a fuel booster pump with 44 per cent larger capacity.

Figure 2 shows the performance that could be expected if the compression ratio were changed during operation. Changing the turbocharger characteristics, such as by an adjusta-

ble turbine nozzle ring, could cause some further improvement, although these data are all for a constant 62 per cent turbocharger efficiency. Adjustment of the engine for maximum efficiency at peak load caused some deterioration in performance at lower loads.

Arrangements were made with three American turbocharger manufacturers to work with the Station. Two of the manufacturers preferred the use of divided exhaust manifolds with only two cylinders exhausting into each manifold. It was therefore desirable that two turbochargers be used for the sixteen cylinder engine so as to reduce the number of manifolds to each turbocharger. The third manufacturer specified a common exhaust manifold, but with built-in venturis to permit utilization of much of the exhaust gas pulse energy. Only one turbocharger was planned for this installation. The turbocharger to be used was a new higher-pressure design which had not been completed at the time the tests were planned.

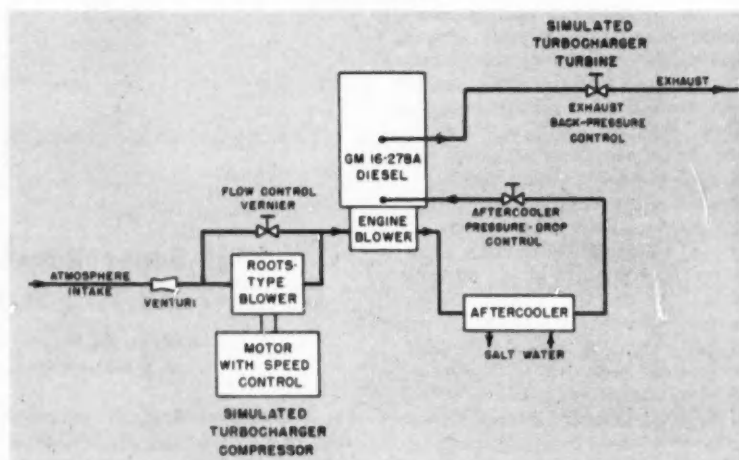
The initial tests showed the value of simulated turbocharged tests. If it had not been already proved what the engine would do under given air supply and static backpressure conditions, the first data would have been very discouraging.

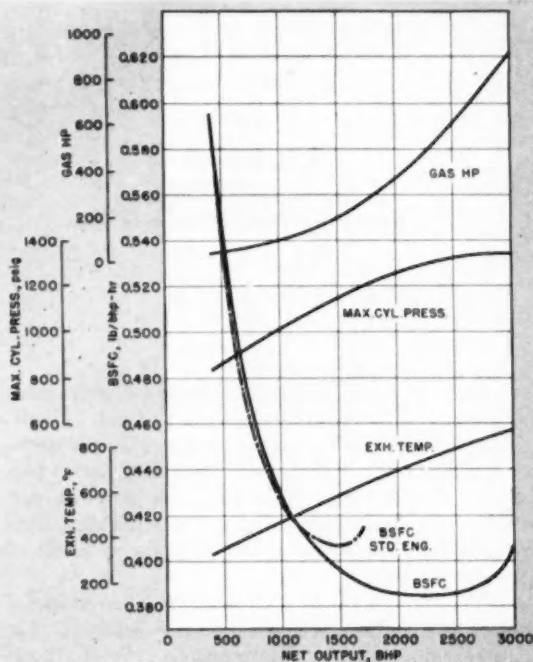
The first tests were made with eight exhaust manifolds, each taking the exhaust of two cylinders that were timed 180 deg CA apart. The four manifolds from each cylinder bank fed into one turbocharger. The indi-

(Turn to page 116, please)

FIG. 1

System used to simulate turbocharger operation in determining engine air requirements





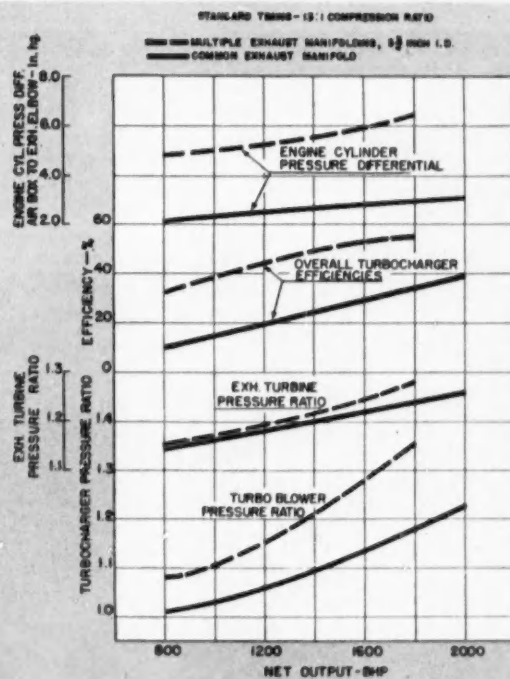
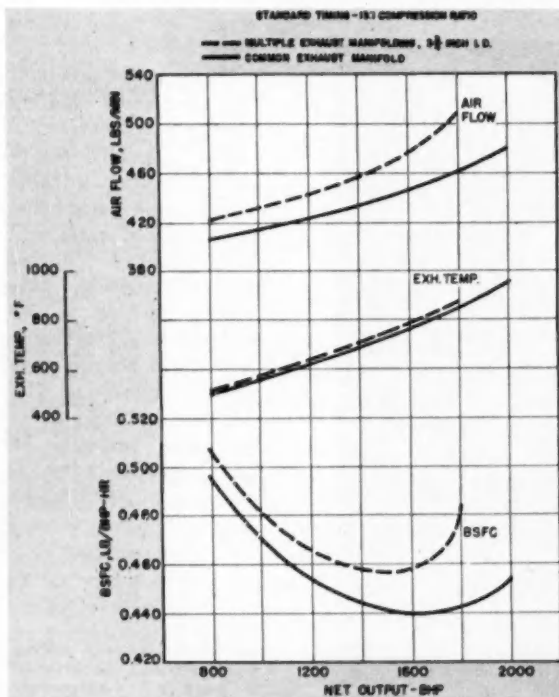
Operational data for optimum supercharging conditions with variable valve timing and variable nozzle area

FIG. 2

Operational Data Graphs

FIG. 3

Operational data for engine with actual turbocharger operation



Mammoth Milling Machine

For

Efficient Production

Of

Large Aircraft Parts

By

G. R. Gordon

Assistant Chief Tool Engineer
Convair Div. of General Dynamics Corp.

A NEW milling machine, aimed at production-type operations on large aircraft parts, has been installed at the Fort Worth plant of Convair Division of General Dynamics Corp.

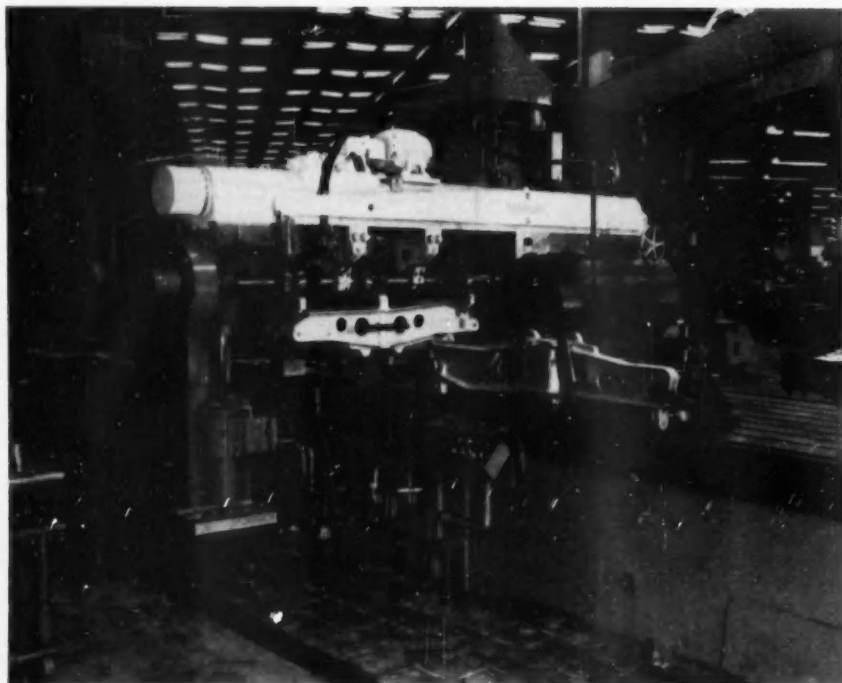
Built to Convair's specifications, the machine is of heavy duty fixed Gantry design, with emphasis on rigidity in holding and driving the milling cutters. The horizontal spindle is 8¾ in. quill size and provides the No. 50 standard mill taper for drawbar type arbor mounting, and 4⅝ in.-11 tapped holed on a 7 in. diameter circle for flange type arbor mountings. A 2½ in. diameter arbor 72 in. long provides for cutters to be mounted over the entire 56 in. table width. One fixed bearing in the outer column and two adjustable, over-arm type bearings give ample arbor support, and an outboard flywheel dampens arbor flexing. This has

proved adequate for the high metal removal rates possible with the 100 hp available on this spindle. Spindle drive is through a change gear transmission providing eight speeds from 241 rpm up to a direct drive at 1800 rpm. This maximum power at high speed has proved very advantageous in machining non-ferrous metals, removing large quantities of metal at high cutting speed.

A work table 56 in. by 192 in. with a longitudinal travel of 168 in. was selected. This is sufficient for machining single parts approximately 144 in. long. There are seven 1-1/16 wide T-slots on 6 in. spacings for attaching work pieces or holding fixtures with 1 in. bolts. The table feed is all hydraulic and the speed is infinitely variable from 0 to 30 ipm with rapid traverse of 100 ipm.

An independent five hp motor drives an auxiliary vertical spindle through change gears providing nine speeds, 242 to 2425 rpm. This auxiliary spindle head is mounted on the vertical beam, and provides full universal angular settings of the cutting tools.

The machine was built by Cincinnati Milling Machine Co. It has Cincinnati standard equipment for automatic table cycling, cam controlled variable feed rate, and tracer control for rise and fall profiling. This control system is all hydraulic and actuates both the horizontal and vertical spindles. The machine is said to be the most powerful in the aircraft industry.



The large Cincinnati milling machine which will be used for work on B-58 supersonic bombers

Fluid Coupling Adapted

TO TESTING OF SMALL ENGINES

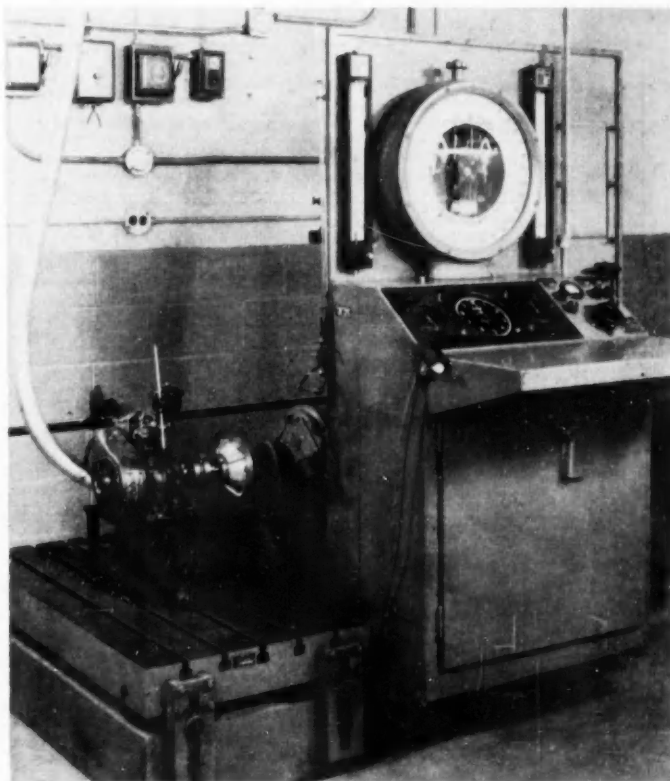
IN testing small single-cylinder gasoline engines, direct coupling to a dynamometer has always been a difficult task to accomplish satisfactorily. In engines of this type, the maximum torque is many times the mean average torque. The ratio can vary from 5 to 30 depending upon the speed of operation and the geometry of the engine.

When the engine is directly connected to a power absorbing means which has relatively high inertia characteristics as shown by the value of its polar moment of inertia or its Wr^2 value, the high ratio of maximum torque to mean torque results in high stress reversals in the coupling. This is due to the fact that the rotating mass of the power absorbing unit acts as a flywheel and therefore tends to produce constant speed or uniform torque.

These high stress reversals produce sufficient stress to cause failure in all of the commercially available couplings and universal joints which were tested at Continental Motors' new Research and Development Laboratory, Detroit, unless the inertia of the power absorbing unit is quite small.

In the case of practically all electric dynamometers which have a capacity in excess of the maximum power of the engine being tested, the armature inertia is of such value that the above failures occur repeatedly.

At the suggestion of Peter Altman, Continental Motors vice president in charge of small engine development, a simple fluid coupling was installed between the engine and dynamometer. This solved the prob-



Single cylinder engine connected to 7½-hp. wide speed range electric cradle dynamometer by means of a fluid coupling

lem and permitted tests to be made without shock on the engine crankshaft or other parts of the system.

The torque transmitted by a fluid coupling is the same at the input and the output end of the coupling regardless of slip. Consequently the power absorbing unit measures the actual torque developed by the engine regardless of the slip. On this basis, the computation of the hp developed by the engine is based on the torque measured by the dynamometer and the speed measured at the engine and not at the dynamometer.

This procedure allows the use of all of the features available in electric dynamometers for the measurement of torque together with the simple controls for varying the load and speed of the engine.

Another advantage of the fluid coupling, due to its damping characteristics, especially in single cylinder engines, is the steady dynamometer readings.

PROGRESS with the Free Piston Gas Generator Turbine

By J. G. Coutant, Fuels Engineer
Barium Steel Corp.

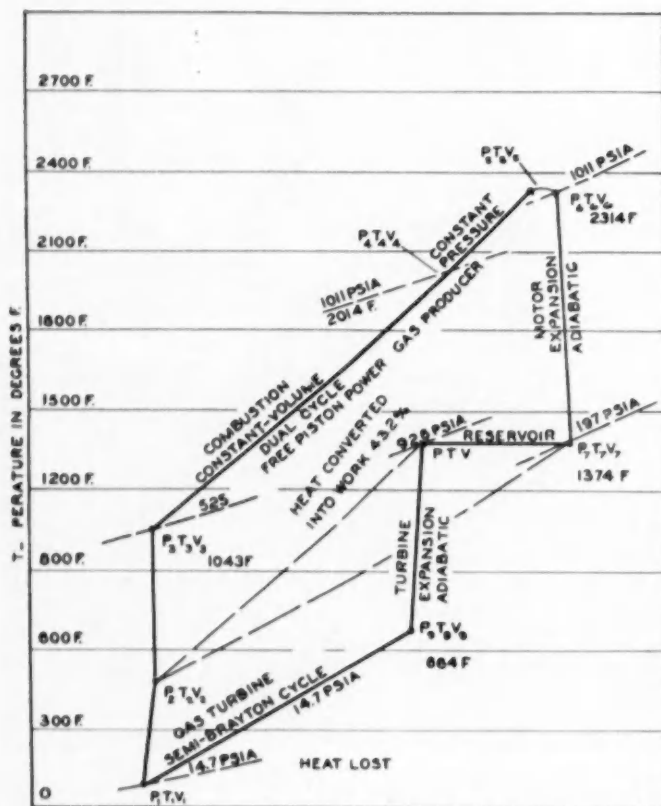


Fig. 2—Entropy diagram

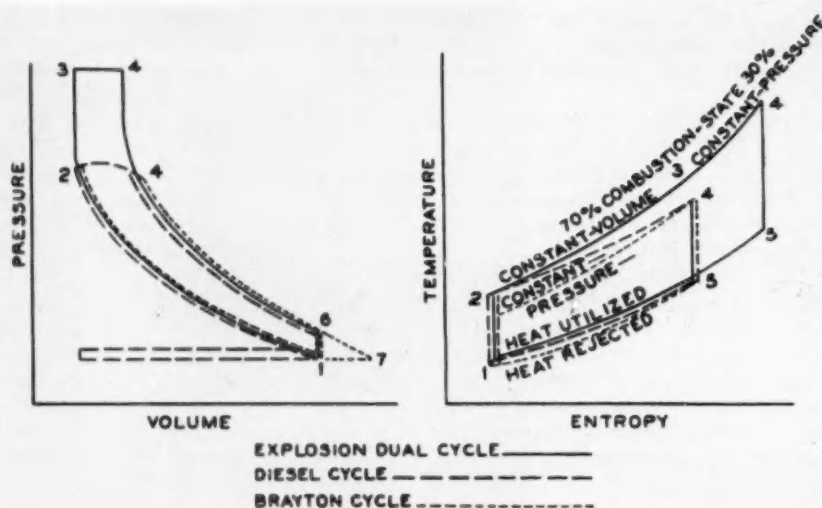
MORE power from fuel, up to between 50 and 100 per cent, has been obtained by gas turbines and gas engines where retarders to the direct conversion of heat energy into power have been eliminated.

This new fuel economy has been achieved by the Pescara and Andreau single cylinder, single acting, no dead center engines. The Pescara gas turbine unit was put into service a few months ago by the Worms Co., of Paris, for the propulsion of a cargo ship. The Andreau engine which achieved the greatest fuel economy is on exhibit at the Conservatoire National des Arts et Metier, Paris, France. These engines operate on the explosion triple heat cycles shown by pressure-volume and temperature-entropy diagrams, Fig. 1, below.

The transient system differs from the steady flow system in that the thermodynamic properties of the fluids and the rates vary with time. The quantity of materials in the system also varies,

Fig. 1—Pressure-volume and temperature-entropy diagrams

(1) Original state, (2) pressure by compression, (3) pressure at C_p burning, (4) temperature at C_p burning, (5) work expansion, (6) Diesel constant-volume, (7) Brayton constant-pressure.



since the weight of materials flowing into the system may not equal the quantity leaving it.

This type of system involves a complicated analysis due to the variation of the different quantities with time.

As a simple example, the gas will be subjected to a change during which the volume remains constant until a final pressure (over that provided by the compressor) and p_4 and T_4 have been reached. The gas will then, it is assumed, follow Boyle's law and Charles's law. The gas which has a specific volume V_4 under an absolute pressure of p_4 at a temperature T_4 will be heated at constant pressure until volume and temperature V_5 and T_5 have been attained. (See Fig. 2.)

This heat cycle is fundamentally responsible for the greater power output from less fuel that has been applied to the free-turbo gas-generator turbine for more direct power production. Further, these units without retarders, nozzles, fixed vanes or curved channels materially reduce kinetic energy and friction losses, substantially all energy being utilized by two or more turbine wheels revolving in opposite directions.

The idea is not new, since The Ministry of Air, France, at the Central Testing Station for Motors and Propellers at Paris, May 11, 1937, at conclusion of trial stated "the pressure of compressed air with two rotors revolving in opposite directions quadrupled the work of a single wheel." The turning of two bladed

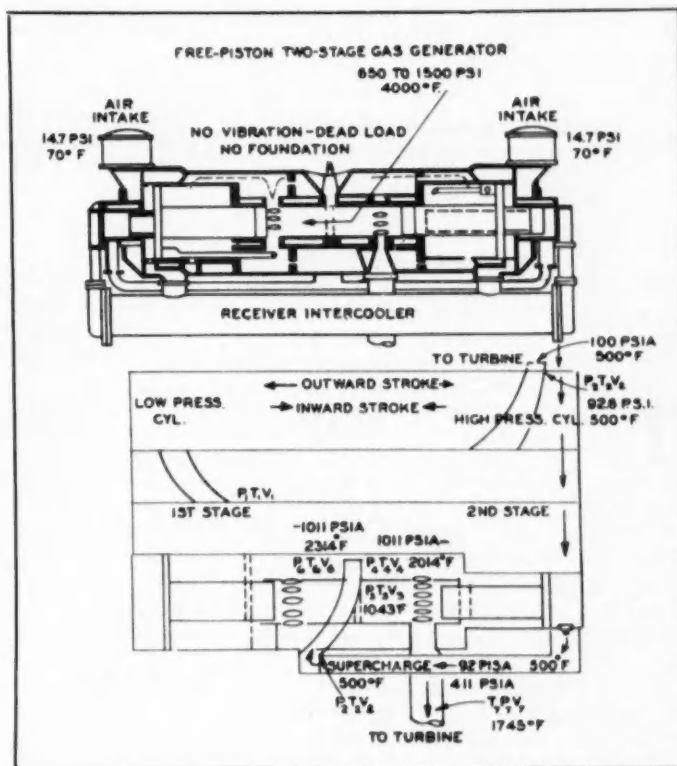


Fig. 4—Free-piston, two-stage gas generator (see entropy diagram)

wheels in opposite directions did the same work as a single rotor revolving at twice the speed. It was pointed out that since the pressure is nearly proportional to the square of the velocity the ratio of work per wheel was 3.7 to 1.

An analysis based on the effective heat energy utilized per row of moving gas turbine blades, indicates the free-turbo gas turbine is as effective as $1\frac{1}{2}$ rows (Curtis), $2\frac{1}{2}$ rows (Rateau), and $3\frac{1}{2}$ rows (reaction) which seems to support the findings of the Ministry of Air.

The opposed moving turbine buckets then move at one-quarter of impinging jet velocity and allow the conversion of a larger portion of the kinetic energy before passing to the three reaction stages.

In operation, the jet impinges on the blades as for an impulse gas turbine, and gas leaving at lower velocity and pressure impinges on blades in second row moving in the opposite, with a high velocity or four times the speed of the bucket offering an optimum speed and pressure compounding for economy. (See Fig. 3.)

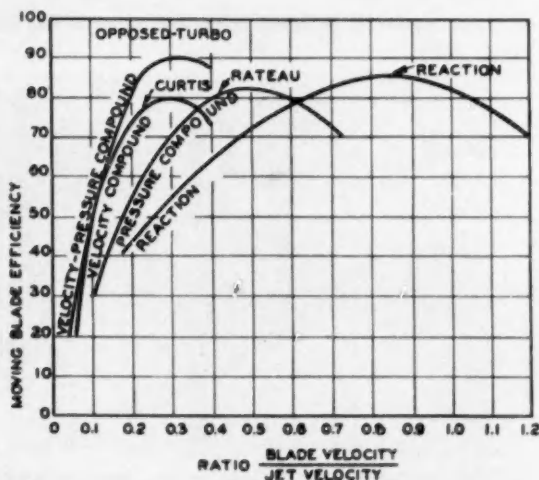


Fig. 3—Chart showing efficiencies of various types of moving blades

Recent Developments in

By Kenneth W. Stalker
Aircraft Gas Turbine Div.
General Electric Co.

TODAY American manufacturers are in a unique position; we are producing defense goods and consumer goods on a ratio that is not all-out defense but on a level where the demands for the defense goods influence our economy. This is also shown by a continuing scarcity of such materials as nickel, cobalt, columbium, tantalum, thorium, and copper which are used in consumer products but are limited in supply because of the demands of jet engines, atomic reactors, and other equipment that is used primarily for the military. Also considering the natural resources of the Iron Curtain countries, we must plan to make the best uses of the material that is available to us. Therefore, we must place special emphasis on manufacturing our parts and products with a maximum material utilization and at a minimum cost.

The shaping of parts for our products often takes the form of machining away the excess metal until a finished part is obtained. Such a method of manufacturing parts is most common in our industry today. Chips and turnings are of little economic value. First we purchase material and then expend money to remove part of it. The material removed clutters the shop, then it is sold to the scrap dealer for only a small per cent of the original price. This loss, plus the cost of cutting and handling, makes the chip our most expensive product.

Management and processing engineers have long realized that machining a part is often more expensive, both in time and material, than in building the part of sheet metal and then fastening the sheet metal parts together by welding, brazing, or riveting. This has resulted in the rapid growth of the fabrication industry. Sand, lost wax, die and shell casting have contributed much to the shaping of metal without loss of material. More recently the use of powder metallurgy has made it possible to produce parts with good material utilization. It is now possible by the use of powder metallurgy to take sponge titanium and convert it directly into parts with a material utilization very nearly the same ratio as it is possible to melt the sponge and convert it into bar stock.

It was found that working many metals improved the strength and toughness of the parts produced. Hot forging works on the principle of plastic deformation of metal to shape it to the desired contours. As the process became more precise, numerous parts were forged to close dimensions without subsequent ma-

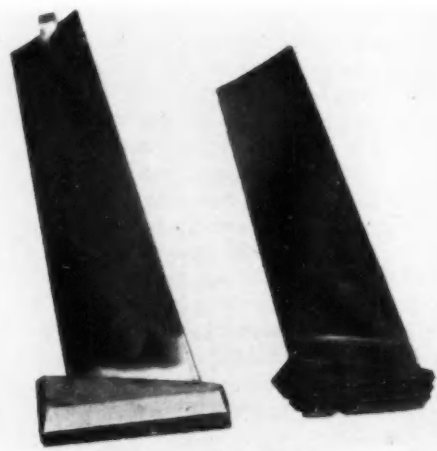


FIG. 1—Jet engine compressor blade that has been forged to size on the airfoil and machined to size on the dovetail

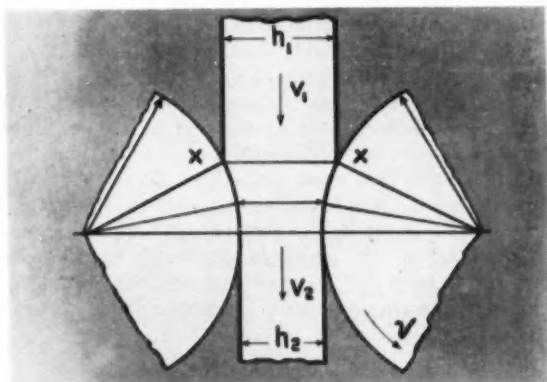


FIG. 2—Forces of rolling metal are shown in this diagram

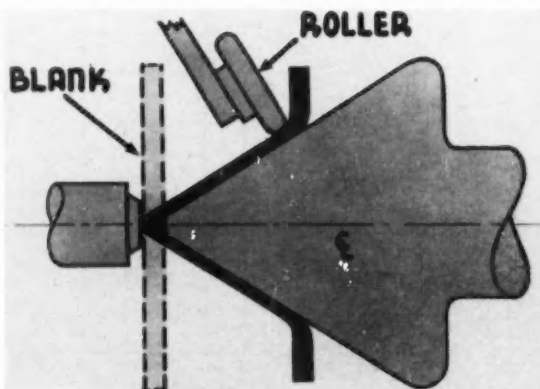


FIG. 3—Sheet metal is used as the stock to produce a cone with reduced wall thickness

Production Without Chips

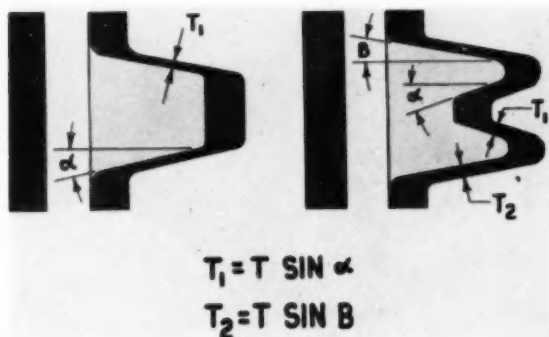


FIG. 4—Tapered wall cones can be produced by the use of developed blanks

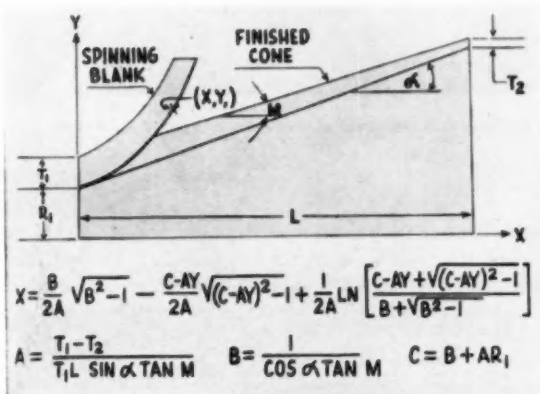


FIG. 5—Die-stamped blank roll formed to a finished cone

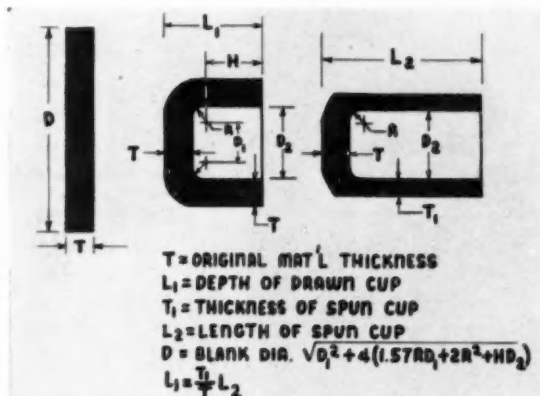


FIG. 6—This figure shows how cylindrical parts can be rolled against a mandrel

chining. Other parts may be forged to finished dimensions with critical dimensions being machined after forging. Figure 1 shows an example of a jet engine compressor blade that has been forged to size on the airfoil and machined to size on the dovetail. More recently, the heavy press program, as sponsored by the Air Force, will contribute much toward the production of large parts with minimum material loss.

Lately there has been a rapid growth in the use of extrusion of metals to produce parts. Many difficult-to-machine parts are now being extruded with great success. In the light alloy field, large tonnages of trim, shapes, and forms are being hot extruded. Many of the steel companies are working on the extrusion process and some are already using it to produce tubing, bar, and shapes of ferrous materials with very satisfactory improvements in material utilization during conversion. Again the process indicates the trend toward the use of plastic deformation of metal to make parts to finished or approximate shape to reduce the amount of material waste.

A more recent trend in the metalworking field is to use the process of plastic deformation to produce finished parts without the added use of temperature. This trend began with the early applications of hammering and coining the more ductile materials such as copper, silver, and gold. The early artisans produced household utensils and ornamental parts by cold working the material. With more and more power being available to the metalworking industry, it was found that the tougher-to-form materials could be cold formed to size without the application of heat, resulting in many parts being produced without subsequent finishing.

The microstructure analysis of stressed parts also shows that metal will flow under compression, without failure, beyond its tensile elongation. The more difficult phase or producing parts by compression was developing methods to apply sufficient force and still allow the metal to flow. The most commonly used method of cold forming metal is



FIG. 7—Compressor blade for aircraft gas turbine produced by the cold rolling process

Push-Button Lubrication

A POWERED lubrication system which lubricates the car by the press of a button is available on 1955 Lincoln and Mercury cars. This accessory, known as Multi-Luber, provides constant lubrication of the chassis, suspension and steering systems.

The system consists of a master cylinder located in the engine compartment from which nylon tubing extends to each front end chassis bearing. On the tip of each nylon tube is a coupling which fits over the regular grease fitting. On the 1955 Lincoln it lubricates all 11 points.

A plunger in the master cylinder pushes forward, forcing the required amount of light lubricating grease through each tube into the bearing. The vacuum power to force the plunger forward is activated by a control button on the instrument panel, thus enabling the driver to keep the car fully lubricated by pressing the button once a day. The entire operation requires only a couple of seconds, and a green light on the control panel indicates the job has been done.

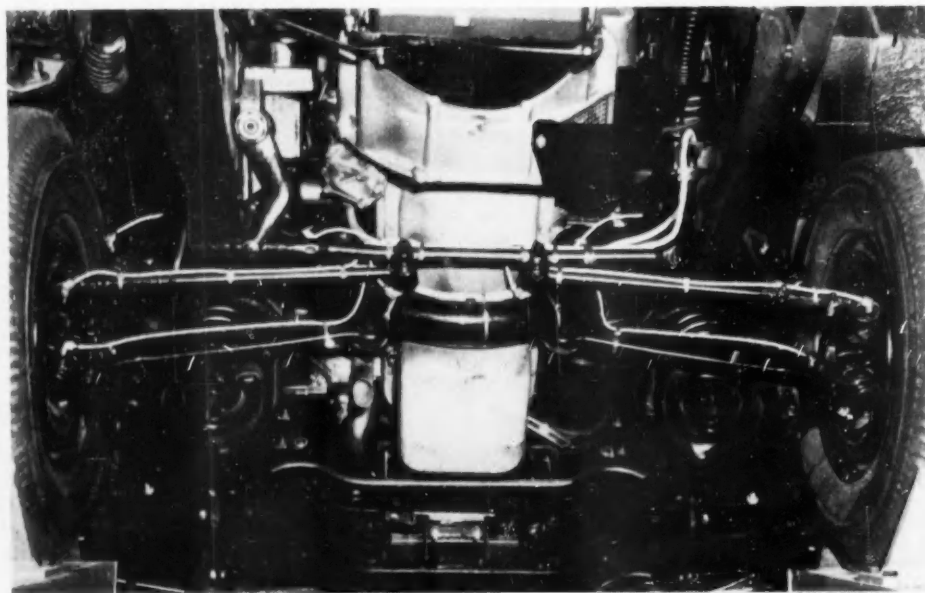
The Multi-Luber can be operated 225 times before it is necessary to replenish the supply of lubricating grease. One seven-ounce can will complete the cycle,

with about 225 lubrications estimated per 10,000 miles.

It is available as a factory-installed option, or may be supplied by an authorized Lincoln-Mercury dealer.



The master cylinder is filled from a seven-ounce can of lubricant



Nylon tubing extends to each front end chassis bearing

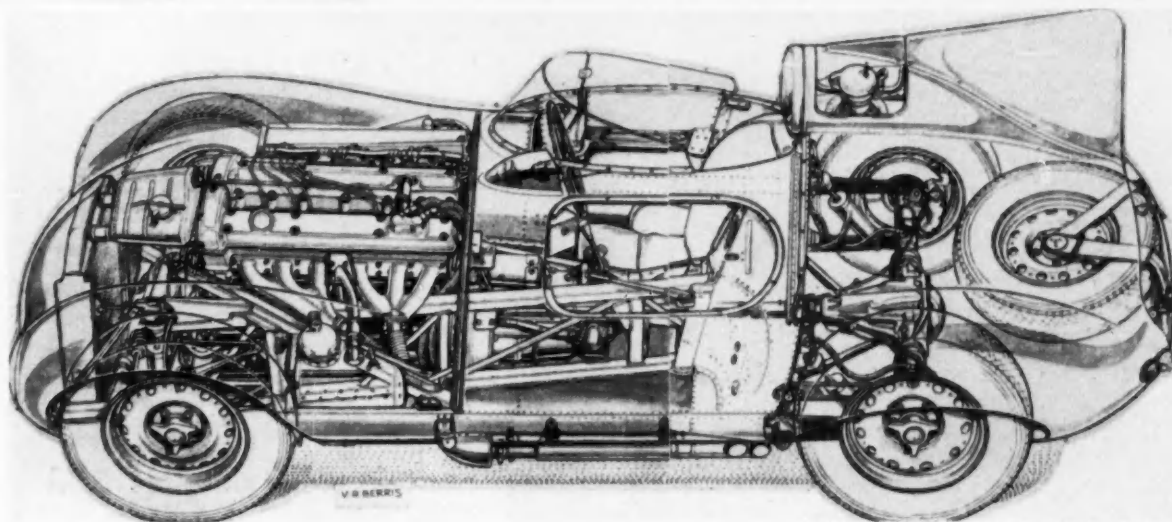


Illustration courtesy of The Autocar, London.

The D-Type Competition Jaguar

CHASSIS design of the British D-type Jaguar has been completely changed from the previous model. There is no separate chassis frame, instead the car is built around a center section of monocoque construction. This center section consists of an elliptical tube with holes cut for the driver and passenger. A front section, integral with the center section, houses

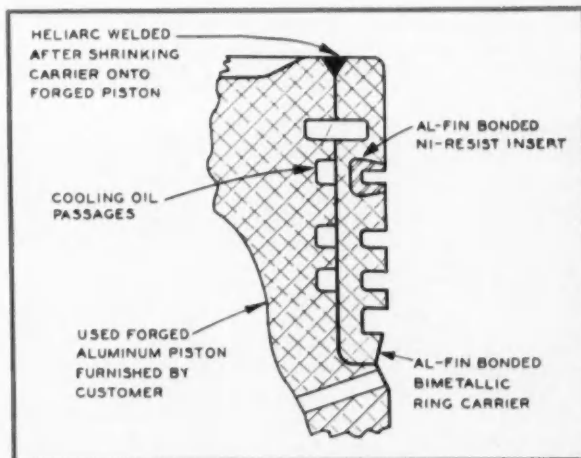
the engine. A tail section is bolted to the center section. It houses the fuel tanks and spare wheel.

Overall height of the engine has been reduced by going from a wet to a dry sump. This reduces hood height and lowers the center of mass of the vehicle. Wheelbase is 90 in. Output of the engine is 250 hp at 6000 rpm.

Diesel Pistons Salvaged by Rebanding

BACK in 1949, Al-Fin, in collaboration with the American Locomotive Co., developed a bonded bi-metallic ring carrier band of cast aluminum bonded to Ni-Resist for replacement use on forged aluminum Diesel locomotive pistons on which the ring grooves had shown excessive wear. The original replacement ring belts were for a 9 by 10½ in. piston for the ALCO 244 locomotive Diesel engine. The cast aluminum bonded to the Ni-Resist ring carrier was shrink-fitted onto the cut-back forged aluminum piston and the cast aluminum ring heliarc-welded to the piston forging around the crown of the piston to prevent leakage.

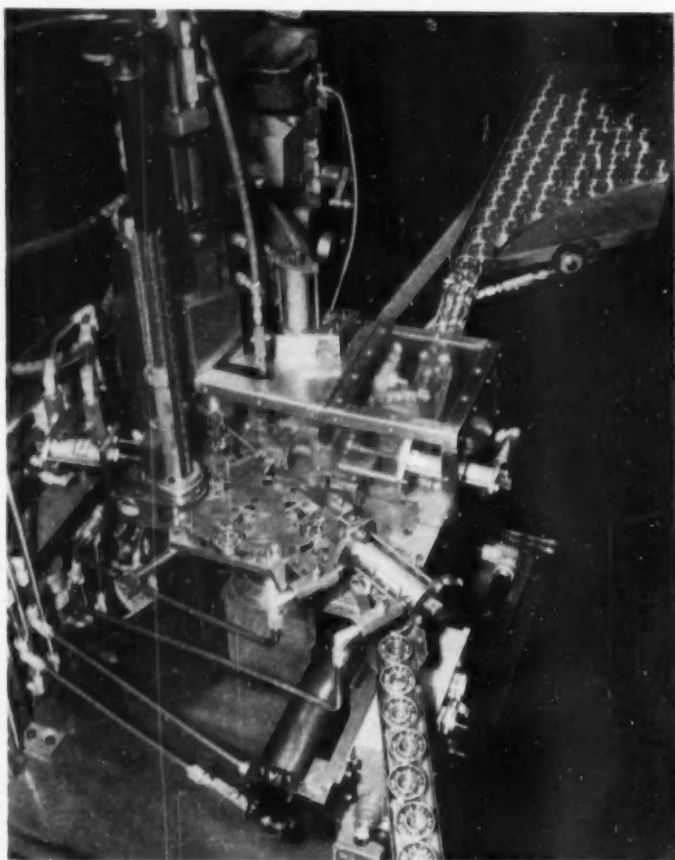
The Ohio Piston Co., in collaboration with the Aluminum Co. of America, an Al-Fin licensee, carried on the development work and Ohio Piston Co. is now offering a piston rebanding service for Diesel locomotive engine aluminum pistons. Such forged aluminum pistons, after they have passed the maximum ring groove wear-point permissible, are sent to the Ohio Piston Co. Ohio machines out the worn ring grooves and then shrinks on a new bi-metallic ring carrier band with



Bonded bi-metallic ring carrier on No. 244 ALCO oil-cooled piston

Ni-Resist upper ring carrier, and heliarc-welds the cast aluminum to the forged aluminum, shown above.

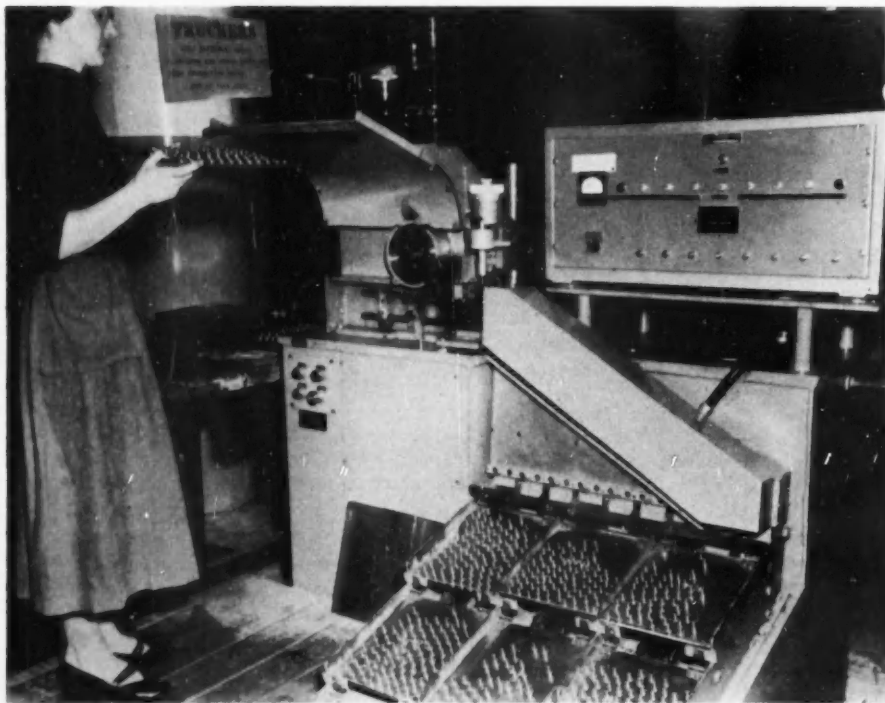
Pistons, rebanded with such bonded bi-metallic ring belts using Ni-Resist inserts, have passed severe railroad tests and were said to be in perfect condition after continual 24-hour service day in and day out. The piston forgings are of ALCOA 32ST6 and the bonded bi-metallic ring carrier belts are of ALCOA A132T551. Ni-Resist No. 1A, an austenitic high-nickel cast iron, is used for the ring insert.



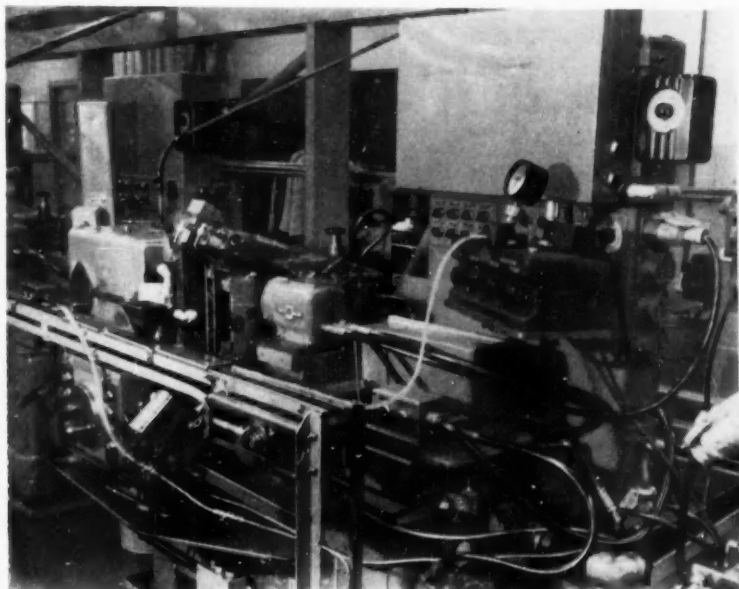
Automatic operations in this machine not only include the loading of balls into the correct positions between the rings but also insertion of a separator after matching. Inner and outer rings are fed into the machine from a loading chute.

Automated Machines in Ball Bearing Plant Reduce Rejections

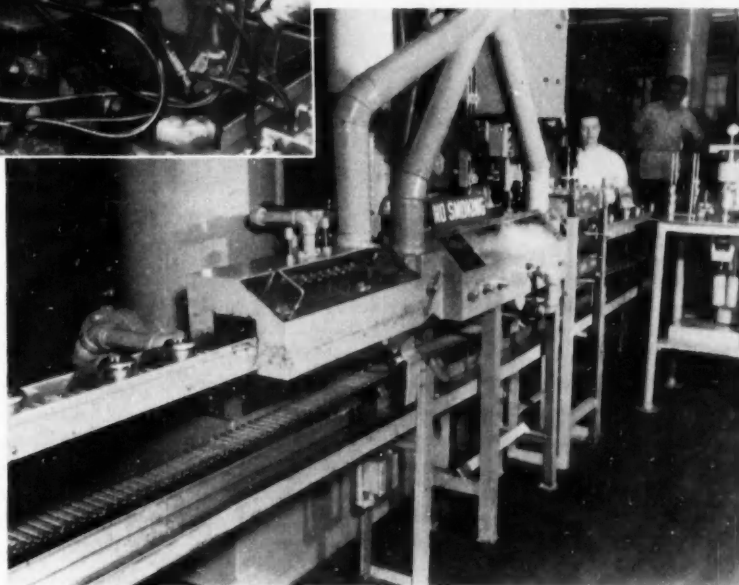
CONSTANTLY installing new equipment and improving methods of manufacture, the New Departure Div. of General Motors Corp. has today some of the finest automated equipment in the anti-friction bearing industry. Through its development and installation of automatic equipment, this GM division is providing a better product at lower cost. Illustrated here are some of the processes which New Departure has recently inaugurated to improve its manufacturing setup. They depict a more efficient cleaning technique, automatic gaging, automatic sorting, and automatic assembly.



Inner rings are now sorted and checked automatically. This installation is a great time saver and eliminates manual selection.



Ultra-modern automatic bore gaging is credited with holding defective bearing rings to a bare minimum. Utilizing air gaging equipment, the machine shuts off automatically whenever a defective part goes through the gaging station.



This automatic jet washer results in the more efficient cleaning of bearings and a marked reduction in rejections. The need for tote pans is eliminated and substantial savings are realized in cleaning fluid consumption.

Objectives of Studebaker-Packard Corp.

WHILE a number of specific details were not disclosed because they have not yet taken concrete form, James J. Nance, president of Studebaker-Packard Corp., recently presented an interesting insight into future plans of the new corporation. Speaking at a press conference in New York City, held in connection with a special preview of the 1955 Packard and Clipper lines, Mr. Nance outlined in general terms the basic objectives of the organization and the methods for attaining them.

Market Coverage

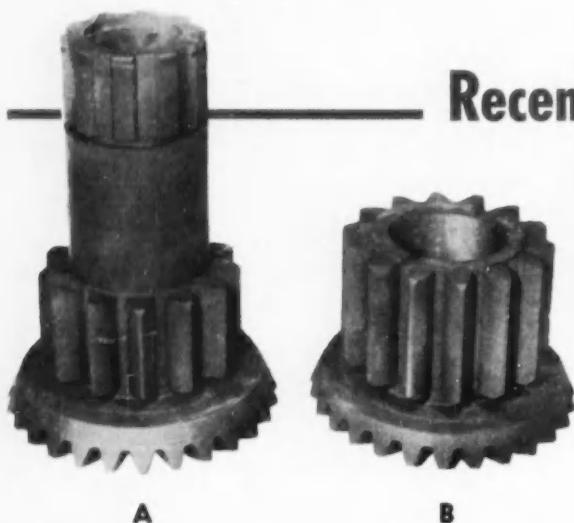
Bent on offering to the car-buying public a full line of cars in a broad

price range, Studebaker-Packard Corp. is aiming at complete market coverage in four price classes. The low price class will include the Champion Six and the Commander V-8. The President 175 hp V-8 will be offered in the lower medium price class and the Clipper in the upper medium price class. Packard will be in the high price class. Trucks will be offered in light and medium weight classes, which account for approximately 85 per cent of the truck market.

In keeping with the tradition of the independent car manufacturers, Studebaker-Packard Corp. will direct its efforts toward designing and building cars which are distinctive, Mr.

Nance said. This is, of course, the basic operating philosophy that has always been an inherent part of the independents' role in the automobile industry, and is exemplified in the torsion bar suspension to be offered on the 1955 Packard line. In looking ahead to 1955, Mr. Nance predicted a sales total of 5.6 million cars, and he reasserted his confidence that Studebaker-Packard would capture a good share of that volume. Later in the week in Detroit Mr. Nance stated the goal of Studebaker-Packard for next year would be 300,000 cars, comprising 100,000 for Packard and 200,000 for Studebaker.

Among the major improvements revealed for the 1955 Packard line, which is to be announced early in (Turn to page 166, please)



Two of the differential side gears produced by Massey-Harris-Ferguson, Inc.

Recent Developments in Gear Making Techniques Increase Productivity

SOME recent developments in gear making techniques have been instrumental in reducing cost and increasing the productivity of heavy duty tractor final drive gears produced by Massey-Harris-Ferguson, Inc., Racine, Wisconsin.

The illustration shows two distinct types of differential side gears used in large tractor final drives. Both present a common problem of how best to cut the spur gear section that abuts the bevel gear shoulder.

For many years the spur gear teeth were cut directly from the rough on gear shapers. More recently the tractor plant acquired several large Michigan Shear-

Speed machines and has tooled them for doing the roughing operation on these gears. Roughing now is done at the rate of 22 pieces an hour, using relatively low cost cutters, said to have very good life. After roughing, the gears are routed to Fellows gear shapers for finishing. By reducing the burden on gear shapers the job can be done more accurately, holding form and dimensional tolerances to extremely close limits. Moreover, the entire cycle from rough to finish is much faster, overall tool cost lower, and tool life much longer than before.

It may be of interest to note some of the gear data as well as physical dimensions so as to visualize the magnitude of the job. Gear A, at the left of the illustration, has 13, 4-pitch involute teeth, pitch diameter of 3.250 in., and face width of 1 29/32 in. Gear B, at the right, has 14, 4-pitch involute teeth, pitch diameter of 3.4983 in., and face width of 2 5/8 in. It will be appreciated that these are real heavy duty gears, involving considerable metal removal.

It may be of interest, too, that the bevel gear in each instance is cut on Gleason Revacycle equipment. These are straight bevel gears, having 27, 5-pitch teeth.

• • •

Brazil's Plans for Manufacture of Light and Medium Trucks

By L. M. Peppercorn

IN February of this year the Sub-Commission on Jeeps, Tractors, Trucks and Automobiles set up a plan for the manufacture in Brazil of light and medium trucks. While this plan has not yet been officially approved by the executive department of the government, it is interesting to note that it is already carried out in practice, although, of course, nobody is forced to adhere to it. That this is so probably comes from the fact that since 1953 trucks must be imported CKD. Moreover, the CACEX (Carteira de Comercio Exterior—Bank of Brazil's Department on Foreign Trade) re-

quires that those parts which are already manufactured in Brazil be omitted from the import list. The result is that about the same domestically manufactured percentage (in weight) is achieved, as has been foreseen in the industrial plan. This is certainly true for the current year of 1954. Whether the new government will approve the industrial plan for the establishment of an automobile industry in Brazil is a matter of speculation.

The plan itself stipulates that light and medium trucks are considered those between 2860 and 7000 lb in-

clusive, complete without bodies but with all wheels (and one spare wheel) and equipped with all tires. A "national" truck is considered a vehicle which, except for the engine, has a minimum of 65 per cent of its weight manufactured in Brazil. According to this plan, the imported trucks must come in CKD with progressively increasing omissions of the parts manufactured locally. Regarding the importation, the omission of the parts manufactured in Brazil is compulsory as soon as this plan is effective and must be a minimum of 20 per cent of the truck's proper weight in 1954, a minimum of 35 per cent in 1955, a minimum of 50 per cent in 1956 and a minimum of 65 per cent in 1957.

The national production manufacturers will have complete freedom of choice of the items to be imported, with the exception of those recommended by the Industrial Development

(Turn to page 160, please)

Remote Indication of Turbine Blade Temperature

A COMPLETE instrumentation system for remote indication of gas turbine blade temperatures has recently been designed by the National Bureau of Standards for the Navy Bureau of Ships. The system includes special high-temperature resistance thermometers that withstand large centrifugal forces, an inductive commutator that transmits signal information from the high-speed rotor to external stationary equipment, and electronic circuitry that interprets the telemetered signals as temperature measurements. Tests on turbines under actual operating conditions indicate that temperature measurements may be made with the instrumentation system to an accuracy of better than ± 25 F at temperatures up to at least 1400 F, where more conventional methods used on lower-speed machinery are not applicable.

The problem has usually been approached by using blade-mounted thermocouples which are electrically connected to the external measuring equipment through brushes and slip-rings. However, rapid wearing of the brushes and the necessity for establishing the temperatures of the thermocouple cold-junctions present difficulties with this arrangement.

An essential element for any instrumentation system measuring the temperature of moving turbine

parts is a means for taking information from the sensing elements in the blades and for transferring it through a coupling mechanism to stationary locations outside the rotating machinery. At low speeds, the slip-ring or commutator and brush arrangements are commonly used. At high speeds, however, or in the presence of oil or water vapor, maintenance of good contact for efficient and reliable signal transfer becomes difficult.

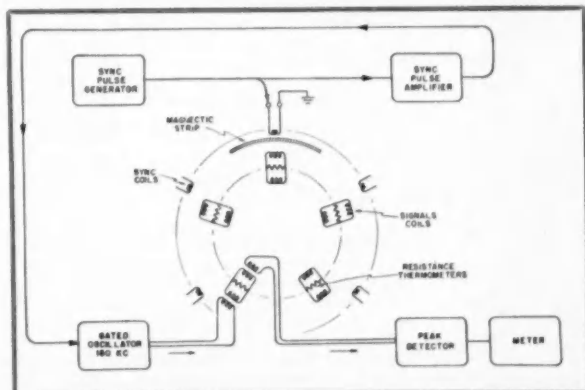
New alternatives to the conventional arrangements are their inductive counterparts, the "inductive slip-ring" and the "inductive commutator." Both have been devised, but the latter has been developed more fully at NBS for inclusion in the instrumentation system. Essentially the inductive commutator consists

(Turn to page 124, please)

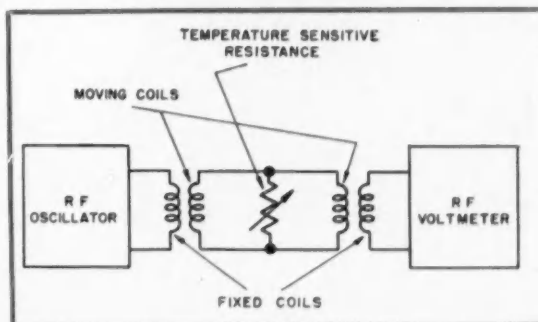


Components of the telemetering system. At left, electronic unit; center, inductive commutator; right, coupling terminal plate.

Block diagram of the temperature telemetering system.



Basic circuit developed by NBS for coupling from moving to stationary portions of rotating machinery.



Built primarily for the Bonneville speed trials, this combination sports car and street coupe is a Sorrel chassis and SR-100 Fiberglass body with a tinted "bubble" top. The body was designed to house twin Dodge V-8 engines; this powerplant team is said to put out 450 hp on gasoline or 610 horsepower on nitro fuel.

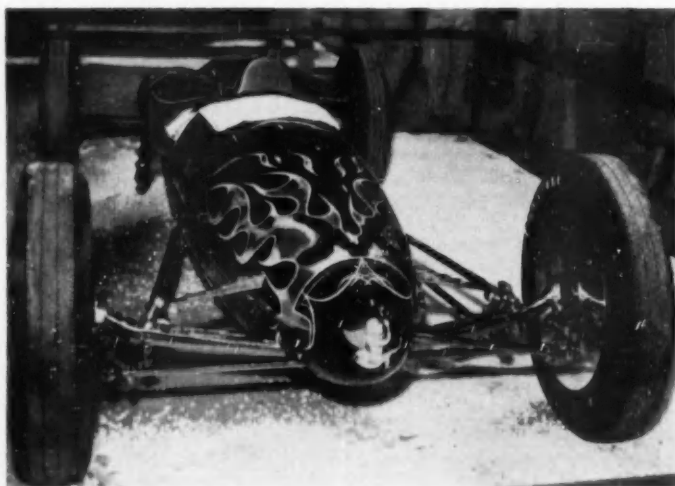


Cars of Special Design Featured at West Coast Motorama

RECORD crowds came to the 10-day Los Angeles Fifth Annual International Motor Revue and Motorama which was held last month. Automobile enthusiasts saw some 200 vehicles, with entire sections of the show devoted to hot rods, custom built cars, antiques, racing cars, classics, motorcycles, and foreign and sports cars.

Among the exhibits were outstanding automobiles selected for their beauty, individuality, design, performance and rareness. Progress was noticeable in the creation of new parts and accessories to beautify and improve the performance of cars.

Lee Ryan, managing director, told **AUTOMOTIVE INDUSTRIES** that this year's show not only had the greatest number of cars, but the largest variety.



Few of this 1940 Mercury custom car's outstanding features can be credited to stock components, for it's largely a product of time-consuming handwork. All body seams are filled in for a smooth, flowing appearance from the hood to the taillights. The frame is adjustable for lowering or raising the car at the owner's discretion. Every exterior component of the engine is chromed.

Reed-Neumayer Lakester. With a body made from an aircraft belly tank, it holds record as fastest open-wheeled car in the world. At 1954 Bonneville National Speed Trials, car traveled 215 mph one way, top speed, and averaged 205 mph for the two-way run. Tubular front axle has transverse spring. Engine is a Cadillac.



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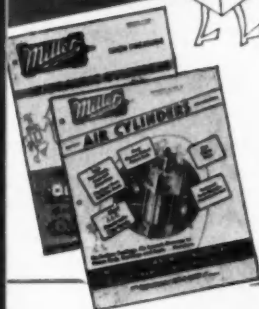


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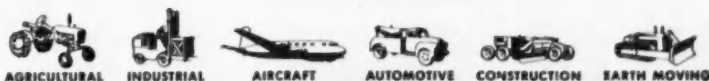
If you are interested in "man-sized" power for your heavy duty power-steering systems without excess bulk or weight, you'll want to test the Pesco Power-steering Pump on your specific equipment.

This outstanding Pesco pump is specifically designed and ruggedly constructed to provide full, dependable power steering for on-and-off-the-road heavy duty vehicles. It is not an adaptation of a

standard passenger car unit applied to heavy duty use. The unit provides a standard pressure relief setting of 750 psi, with optional pressures to 1200 psi if desired.

A limited number of these exceptional Pesco pumps are available for field tests on specific equipment. For full information call or write the Home Office, Bedford, Ohio.

For full information on Pesco Hydraulic Pumps, Power Packages, Hydraulic Motors, Electric Motors, or Controls and Valves, call or write the Home Office, Bedford, Ohio.

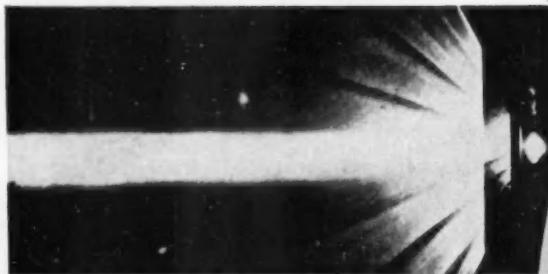


PRODUCING THE BEST IN HYDRAULIC EQUIPMENT AND ELECTRIC MOTORS

BORG-WARNER CORPORATION
24700 NORTH MILES ROAD • BEDFORD, OHIO

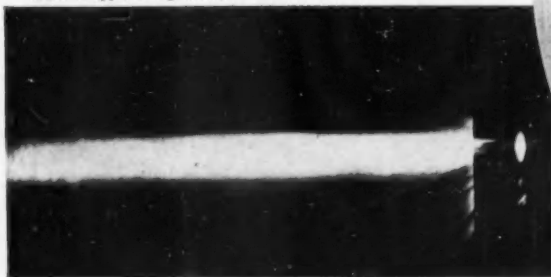
New TUNG-SOL All-Glass Sealed Beam VISION-AID HEADLAMP

IMPROVED BEAM PROVIDES
BETTER VISIBILITY



Stray light radiates strongly from conventional sealed beam headlamps. This uncontrolled light reflected back from fog, rain, snow or dust, blocks visibility in bad weather.

Vision-Aid Headlamp emits little stray light—almost none above the useful beam level—improves visibility in bad weather. The light appears cooler to approaching drivers.

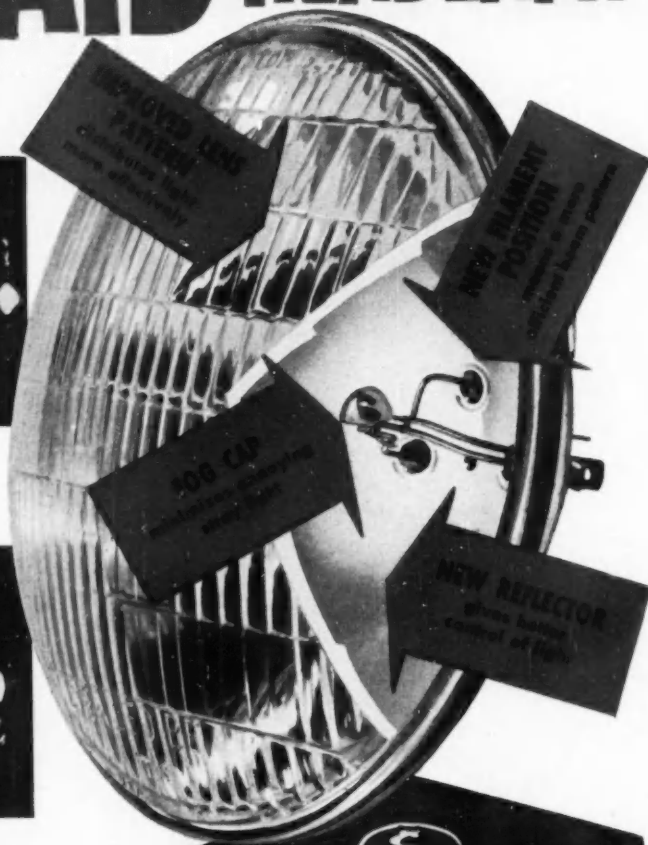


VISION-AID HEADLAMP is the most powerful and safest headlamp ever developed. Light output has been increased by raising the lower beam wattage from 35 to 40 and the upper beam from 45 to 50 watts.

VISION-AID HEADLAMP provides 23 per cent more light on the low beam and 26 per cent more light on the high beam.

VISION-AID HEADLAMP projects the passing beam up to 80 feet farther ahead, but more to the right, at the same time reducing the amount of light directed toward an approaching vehicle.

VISION-AID HEADLAMP produces less uncontrolled light, thereby reducing the light reflected back at the driver from fog, rain, dust or snow encountered in bad weather.



TUNG-SOL ELECTRIC INC., Newark 4, N. J.

Sales Offices: Atlanta, Chicago, Columbus, Cedar City (Los Angeles), Dallas, Denver, Detroit, Newark, Philadelphia, Seattle.

Tung-Sol makes 25 Glass Sealed Beam Lamps, Signal Lamps, Pumps, Tubes, Radios, TV and Special Purpose Electron Tubes and Instruments Products.

TWO TYPES

5040 for 6 volts 5400 for 12 volts

Assembly operation eliminated

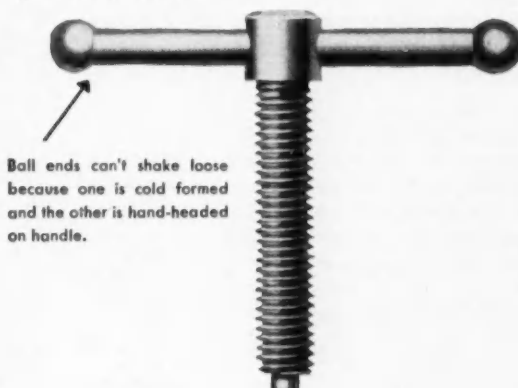
The old way:

This vise handle was originally cut from bar stock by screw machine. One end of the handle was threaded while the other was machined to a ball head. To complete the assembly a separate internally threaded ball head had to be screwed onto the threaded end by hand.



The National way:

Our "Special Products Service" showed how this vise handle could be produced faster and at lower cost by cold heading. The handle and one head were cold formed to required dimensions. Then, the handle was inserted through the drilled hole in the head of the jaw adjusting screw and the other end was hand headed. Result... substantial savings in material and production costs.



Bring your "Special" problems to National

National has the experience and wide range of cold heading equipment needed to solve many "special" problems. Our "Special Products Service" representative will be glad to study your requirements. Write for free copy of National's "Special" fastener booklet.

REPRESENTATIVES IN:

Chicago
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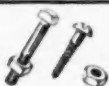
THE NATIONAL SCREW & MFG. COMPANY

Cleveland 4, Ohio

Pacific Coast: National Screw & Mfg. Co. of Cal.
3423 South Garfield Ave., Los Angeles 22, Cal.



Fasteners



Model Chains



Chester Hoists



Farval helps mill and drill a camshaft every 13 seconds

FARVAL—
Studies in
Centralized
Lubrication
No. 164

CENTRALIZED lubrication is a must for automatic production on machine tools like this Kearney & Trecker four-station rotary indexing machine. Protected by a Farval centralized system, this machine mills and drills 288 camshafts an hour.

There's never any time lost for oiling or greasing because *Farval lubricates while a machine is in operation*. Uncounted hundreds of hours of oiling labor are saved, too. Thus, this foolproof system of lubrication keeps machines producing parts faster and at less cost, and keeps maintenance costs at a minimum. Once Farval has been installed on a machine tool, it soon pays for itself—often in a matter of a few months!

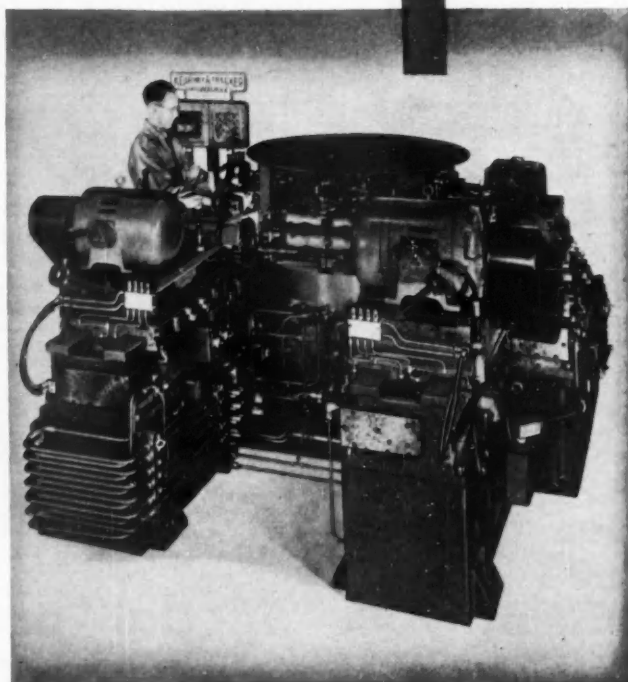
How Farval Works

FARVAL is the Dualine system of centralized lubrication that delivers a measured amount of clean lubricant at regular intervals to *every* bearing. From a central station, lubricant is pumped under pressure, by hand lever or automatically, to a measuring valve at each bearing, delivering the *exact* amount of lubricant required.

Free Lubrication Survey

Let us send one of our lubrication engineers to inspect your plant equipment. Without obligation, he will present a written analysis of what Farval can do for you. Write for Bulletin 26 for the complete Farval story. The Farval Corporation, 3296 East 80th Street, Cleveland 4, Ohio.

Affiliate of The Cleveland Worm & Gear Company, Industrial Worm Gearing. In Canada: Peacock Brothers Limited.



KEYS TO ADEQUATE LUBRICATION—Wherever you see these Farval valve manifolds, dual lubricant lines and central pumping station, you know a machine is being properly lubricated.

This Kearney & Trecker four-station rotary indexing machine at a famous automobile plant has 22 points of lubrication served by a Farval automatic system handling light oil.



News of the MACHINERY INDUSTRIES

By Thomas Mac New

NMTBA's Fifty-Third

President of the National Machine Tool Builders Association, Herbert L. Tigges, executive vice-president, Baker Bros., Inc., Toledo, led off the 53rd annual meeting held at White Sulphur Springs, W. Va., last month by gazing into the crystal ball. He stated that metal-working plants have a three-fold opportunity to cut cost in the competitive market. He enumerated (1) the change in the depreciation provisions of the Internal Revenue code; (2) the accelerated rate of invention, design and development; and (3) the forthcoming machine tool show to be held in Chicago next September. Mr. Tigges said, "We must make the replacement of old machines by new ones so attractive to the metal-working industries of the country that they will modernize their plants to the degree required for the continuing protection of the U. S." Talking to the 300 top executives representing the machine tool industry, Tell Berna, general manager of the Association, stated that foreign orders constitute about nine per cent of the industry's total, and defense orders represent 14 per cent. Of the 77 per cent remaining, Mr. Berna went on to say, the expansion of domestic metal-working industries and the modernization of equipment is the one great hope of closing the gap between the volume of new orders and of shipments, and stopping the ebbing away of the nation's capacity for producing machine tools. A year ago the industry's capacity was about \$120 million a month. Now it is about \$100 million.

A paper given by Joseph T. Vinbury, chairman of the advertising committee of the NMTBA and advertising manager, New Britain Machine Co., stressed the advertising of the show to acquaint all machine tool users with what the show can do for them. He stated that the new machine models don't mean a thing unless they can be translated into terms of what the user is going to get out of them profit-wise. He emphasized

the utilization of case histories, all the reasons why, all the testimonials, the good features, the advantages and economic proof.

William E. Rutz, chairman of the Machine Tool Show committee and executive vice-president, Giddings & Lewis Machine Tool Co., gave a complete report on the plans for the 1955 show. He stated that registration cards will be distributed around April of 1955 so that the registrations will be done in advance as much as possible, thereby eliminating confusion at the registration desk.

Ralph S. Howe, chairman of the NMTBA committee on permanent defense capacity, and president of New Britain Machine Co., spoke on the Vance report and on the Government budget for machine tools. He stated that the \$100 million recently allotted is inadequate to build the country's machine tool reserve, but it is pleasing to note that the principles set forth in the Vance report are being recognized as a sounder approach to the problem of preparedness. He also noted that the Government owns about 450,000 machine tools with an estimated replacement value of \$6 billion. He stated that the Government should be replacing about 16,000 of these machines each year at a cost of approximately \$240 million.

Concerning the new tax situation, Richard W. Banfield, chairman of the NMTBA sub-committee on tax policy and executive vice-president, Pratt & Whitney Div., Niles-Bement-Pond Co., stated that although the administration has made a good beginning in creating a fair and sound tax structure, the machine tool industry is still faced with unrealistic Bulletin F. He said that conferences already have been arranged with the Treasury and Internal Revenue Service to try to bring about a change in the concept of Bulletin F and in its classification of machine tools and the outworn notion that the cost of machine tools must be written off over their useful life.

**Opportunities for
Cost Cutting in Metal-Working Plants,
and Methods for
Closing the Gap Between New Orders
and Shipments Discussed by NMTBA**

Reporting on procurement progress, Charles S. Davis, Jr., chairman of that NMTBA sub-committee and vice-president, Lake Erie Engineering Corp., stated that the principal efforts of the committee have been devoted to an attempt to eliminate certain defects in the procurement process as related to the supply of machine tools to the Government and its prime contractors.

One of the features at the annual fall meeting of the Association was the election of officers. Milburn A. Hollengreen, president and general manager, Landis Tool Co., Waynesboro, Pa., was elected president of the Association at its 53rd annual meeting held here at the Greenbrier Hotel.

Louis Polk, president, the Sheffield Corp., Dayton, O., was elected first vice-president; and Jerome A. Raterman, president, Monarch Machine Tool Co., Sidney, O., was elected second vice-president and director. Mr. John C. Cotner, president and general manager, The Hydraulic Press Manufacturing Co., Mount Gilead, O., was re-elected treasurer.

New directors elected, in addition to Mr. Raterman, were: Henry D. Sharpe, Jr., president, Brown and Sharpe Manufacturing Co., Providence, R. I., and Perrin G. March, III, president, the Cincinnati Shaper Co., Cincinnati, O.

Tell Berna was reappointed general manager of the Association. Mrs. Frida F. Selbert was re-elected secretary.

Metalfinishing Show

Approximately 2000 executives and supervisors of polishing departments attended the First National Metal-finishing Show and Clinic, sponsored by Behr-Manning Corp. and 34 co-operating machinery manufacturers, which was held recently in Chicago. Some 13 problems in the finishing of stainless steel and 11 problems in the finishing of aluminum were presented at the clinic meeting. Several of these problems were approached by the



A visitor at the Metalfinishing Show sees how parts for automatic facing to close tolerance are placed in fixtures mounted on one of the 20 bed plates of a new Engelberg-Huller automatic feed attachment. The device adapts a vertical platen grinder to continuous production-line work. As the parts proceed around the line, a cam thrusts them forward into precisely controlled contact with the eight-in. wide lubricated belt traveling downward

very practical means by utilizing some of the 72 machines of various types which were in operation during the exhibit. According to the sponsors of the Show, at least 90 per cent of the visitors had specific production problems on coated abrasive belt applications. In two unusual instances, laminated phenolic parts and polyester sheets were being finished for the reverse of the usual objective—to roughen the surface for paint adhesion.

Of significance equal to the new equipment gathered together and revealed at the Show was the assembling at one place for the first time of the 50 technical specialists from those machinery and coated abrasive manufacturing firms who have brought into being the modern technology of production grinding and polishing.

Notable new approaches to machine tool versatility with the coated abrasive belt included the biggest micro-finisher yet built (30 in. wide) for tandem prepolishing of steel strip before forming rather than after, a twin-belt surfacer which will do both sides of flat work-pieces at once in continuous line production, and a grinder which will hold tolerances to 0.0005 in. in sizing webs of rubber, mica, laminated plastics and other non-metallics so widely used today in

conjunction with steel in appliances, aircraft and automobiles.

Ingenuity in small tools for precision grinding and polishing has fostered several idler-and-extension attachments for adapting existing

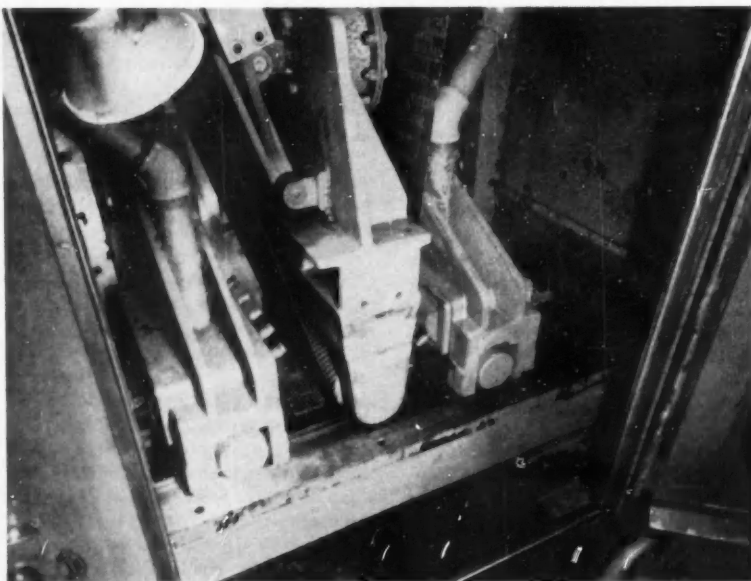
grinding spindles to contact-wheel and belt usage—for contouring jobs, longer abrasive life, and the ability to use the new grits, grades, widths and backings now available in belts. One new small unit runs twin belts off a single motor for deburring and blending. Another uses the yoke principle of contact wheel support to permit exceptionally small contact wheels (down to one inch) which reach through small openings and corings.

The big news in backstand idlers (which have accomplished so much in permitting lathes and jacks to be used with belts) is a unit with a six-in. reinforced plastic pulley adjustable for tension and tracking from the operator's normal working position, and employing a double-lever arc method of adjustment for tracking which doesn't strain the belt in any way.

The widest variety of contact wheels ever shown—of more different designs, materials and special groovings—was a feature of high interest. One wheel featured a plastic expendable hub to circumvent tire-changing or the discard of costly hub constructions after protracted wheel use.

Several of the new pieces of equipment featured the platen method of achieving belt-work contact, in both horizontal and vertical orientations. Platen pressure reduces "dubbing" at the edges of sharp-edged work.

(Turn to page 182, please)



A permanent magnetic chuck holds the small drilled stampings in this machine at the Metalfinishing Show as they are carried to the coated abrasive belt for deburring and sizing. Parts are finished with greater speed as the conveyor belt moves the parts at 10 fpm. A liquid coolant is used on this waterproof Metallite coated abrasive belt

NEW EQUIPMENT

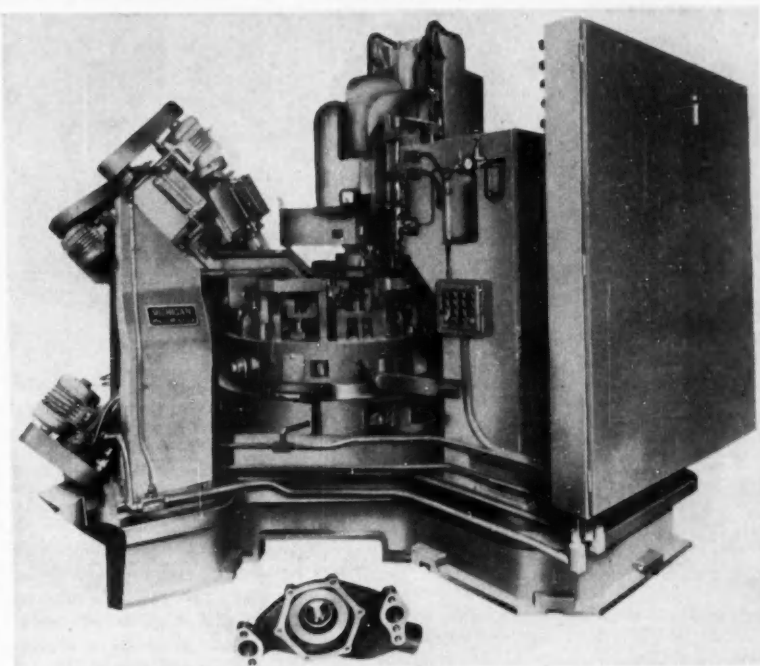
PLANT • PRODUCTION

FOR ADDITIONAL INFORMATION, please use reply card on PAGE 89

Angular Holes Drilled in Pump Body

THE Angle-Matic special machine drills, chamfers, spot faces and taps water pump bodies for V-8 engines. It drills angular holes by means of a two-position hydraulically operated fixture and angular mounted units. The machine is built around a standard Hydro-20 column assembly. It incorporates a special base and special risers for the horizontal and angular units. It produces 120 pieces per hour. *Michigan Drill Head Co.*

Circle 56 on postcard for more data



Michigan Drill Head's Angle-Matic.

Coaxial Hydraulic Unit

KNOWN as Model E, a 1½-hp hydraulic unit features the ram coaxial with the spindle, exerting its full force directly behind the head. The splined spindle shaft extends through the center of the cylinder, piston, and ram, and projects through the face of the ram head. Spindle driving sheaves are mounted on a housing to which the cylinder head is attached.

A support at the spindle end of the ram rides on ways with which the unit is furnished, throughout the length of its stroke. The unit is equipped with hardened ways which have no set dimension relative to the length of the unit and can be extended to accommodate the bushing plates.

A two-in. rabbet in the face of the spindle support locates the multiple head to be attached to it. Adequate clearance is allowed so that all screw heads for fastening can be inserted from the reverse side of the angle plate.

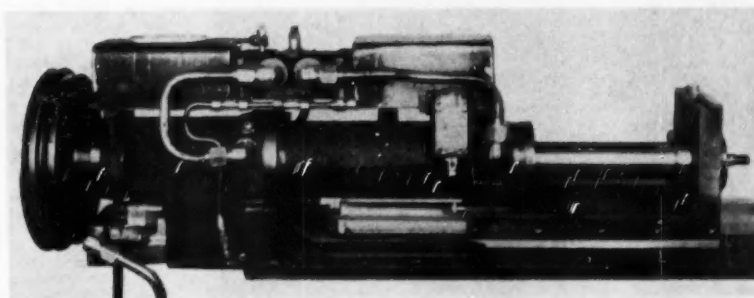
The unit is offered with a ram stroke of six, nine, or 12 in. Feed rate is zero to eight ipm, with a traverse speed of 240 ipm. Since pump and spindle are driven independently, pump speed can be set for any traverse speed required to synchronize

with other units. Spindle speed can be set anywhere from 600 to 3600 rpm.

A two-solenoid valve is employed to operate the ram in both directions. When synchronized with other units, this valve is interlocked in such a

way as to return the ram in case of emergency. The ram is polished in a longitudinal direction, and standard piston rings are used. *Rock River Engineering Co.*

Circle 57 on postcard for more data



The Model E hydraulic unit for tool heads.

NEW

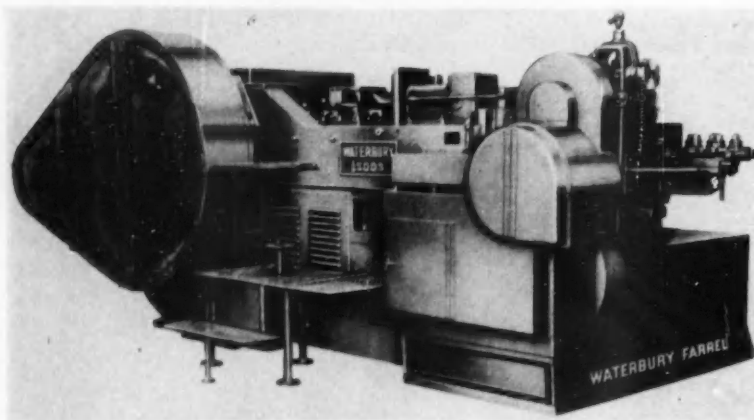
EQUIPMENT

PLANT • PRODUCTION



For additional information, please use postage-free reply card on page 89

Solid Die Cold Header



A 1½-in. capacity solid die double stroke cold header will produce headed blanks up to six in. long from an eight in. maximum wire cut off, at 80 per minute. Shorter blanks up to 3½ in. can be headed at 100 per minute. Crankshaft throw is the only difference in construction. (Waterbury Farrel Foundry and Machine Co.)

Circle 58 on postcard for more data

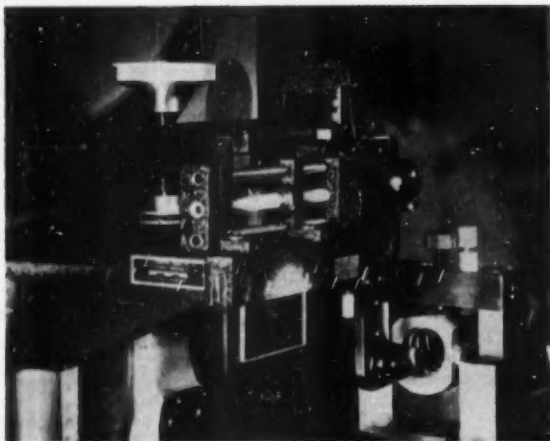
Improved Belting

A NEW line of Compass HD transmission belts is being placed on the market. The company announced recently development of the so-called 3-T process technique for synthetic fil-

aments that stabilizes the wild stretch characteristic of man-made fibers. The resulting product is thinner, more flexible and capable of carrying greater loads than its predecessor. Goodyear Tire & Rubber Co.

Circle 59 on postcard for more data

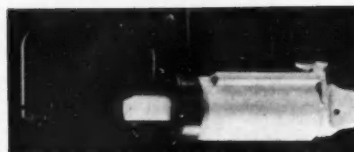
Tracer for Blind Gaging



The model 24 coordinate tracer attachment for optical projection gaging is designed to trace hidden contours. Various arms are available, and arm motion is magnified and projected on the screen. Internal dimensions of a ball nut are being gaged on this setup. (Optical Gaging Products, Inc.)

Circle 60 on postcard for more data

Valve Inserting Tool



For inserting tubeless tire valves into wheel rims, the M-1161 valve inserter has been devised. The tool operates on 80 to 90 lb of air and has a C type yoke that will span all wheels. Rubber valve is started in the rim valve hole, the pin in end of yoke is inserted into bottom of valve and one stroke of inserting tool pushes valve into place. (Rotor Tool Co.)

Circle 61 on postcard for more data

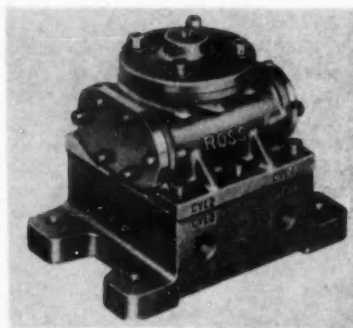
Air Blast Valves

DELAYED action air blast valves have been introduced to the line of production tool valves. These valves are built to blow after the cam has passed over the valve rolled. This delayed action valve is required on compound blanking dies and similar jobs where stamping is freed at the top of the press stroke. These delayed action valves, or other types can be had with hose, mounting brackets and nozzle assembly and cam or cam strap.

A full line of sub-assemblies is available, as well as various parts. When attached to punch presses these units provide automatic ejection of parts. F. J. Littell Machine Co.

Circle 62 on postcard for more data

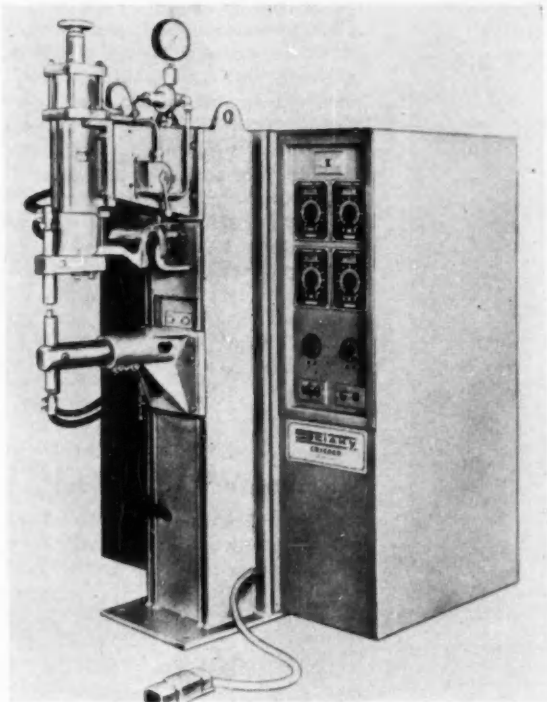
Remote Valve



A retold or remote controlled valve recently announced is a four way, base mounted, pressure operated model. It is controlled by air from a remote pilot valve which may be hand, foot, cam or solenoid actuated. Both actuation and reversal are immediate. Main valve pressures can go to 125 psig and pilot air pressures may be equal to or greater than main valve pressures, but not less than 30 psig. Operating temperatures can go up to 175F. (Ross Operating Valve Co.)

Circle 63 on postcard for more data

Three Phase Press Type Welder



Standard air operated press type SPT 1 spot and EPT 1 projection welders are of a series of three-phase welders available in 40 kva, 50 kva and 75 kva at 50 per cent duty cycle. The SPT 1 (shown) can be supplied from 18 to 42 in. throat depth, with an electrode force of 1000 lb to 1575 lb at 80 psi. The EPT 1 can be supplied from 12 to 30 in. throat depth. (Sciaky Bros., Inc.)

Circle 64 on postcard for more data

Portable Test Chamber

A CLIMATIC test chamber line with full instrumentation and temperature range and one to four cu ft of test area has been developed. It is small enough to be rolled through standard doors. It has a temperature range of +300 to -100 F and wider ranges are available if needed. Humidity features can also be added.

The chamber uses the Freon 13 and 22 cascade system. Standard features include all metal construction, oven baked enamel exterior, rigid vapor proof insulation, and stainless steel interior. Conrad, Inc.

Circle 65 on postcard for more data

Grinder for Small Crankshafts

THE 10-in. type H precision grinder for finishing the pins of small crankshafts recently developed is available in two lengths between centers for either 16-in. or 34-in. crank lengths. Crankshafts are held at both ends in heads which are driven in unison. Clamping fixtures are hydraulically operated.

Both hand and hydraulic feed is provided for the grinding wheel head, which carries a 36-in. diameter wheel. The wheel head will advance rapidly, slow down for slow grinding of cheeks and pin diameters. At a predetermined point the feed will stop, and after a spark-out period, rapidly reset to the back position.

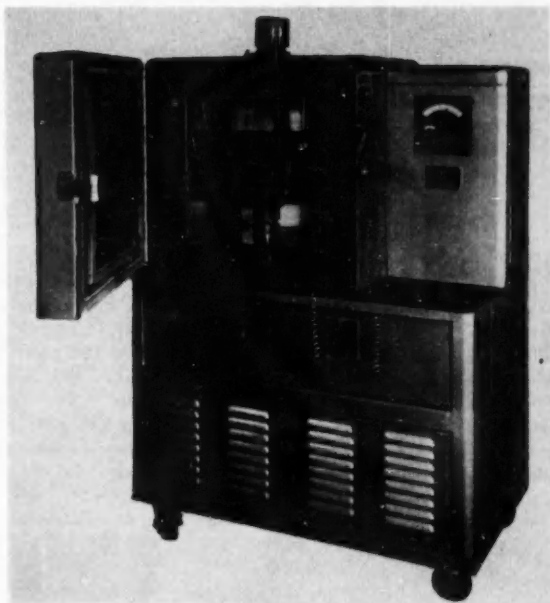
Centrally located controls include hydraulic traverse with variable rate, which is dial controlled. A two speed hand traverse is provided.

Microsphere one-piece steel-habbitt bearings used for the grinding wheel spindle can be adjusted for running clearance.

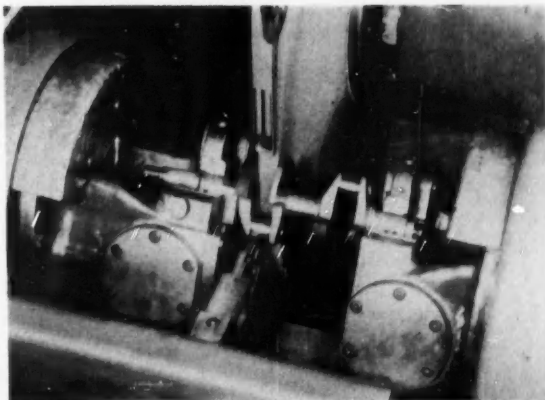
The one-piece bed casting includes reservoirs for hydraulic oil and coolant. Landis Tool Co.

Circle 66 on postcard for more data

Conrad test chamber. Ports, shafts or electrical connections in chamber and view windows are provided as needed, and instrumentation can be specified to handle any types of tests.



Landis type H grinder. This machine grinds crankpins for small engines and compressors.

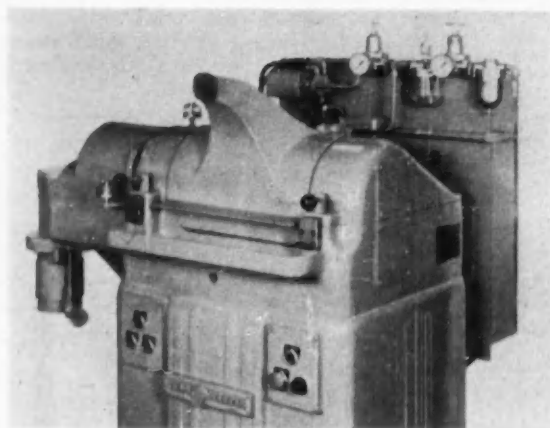


NEW EQUIPMENT

PLANT • PRODUCTION

For additional information, please use postage-free reply card on page 89

Automatic Gear Speeder



The new Red Ring automatic cycle gear speeder for sound testing production spur and helical gears in semi and mass production operations.

RED Ring gear speeders equipped with automatic cycle controls are now available. Features in the Model GSC, 10-in. OD capacity machines include air cylinder clamping and braking controls; and a push-button controlled automatic operating cycle in which the gear to be checked is run in contact with a mating production gear or a master gear.

Cycle adjustments and fixture changes can be made on these machines, permitting them to be economically feasible for many semi-mass production gear inspection operations.

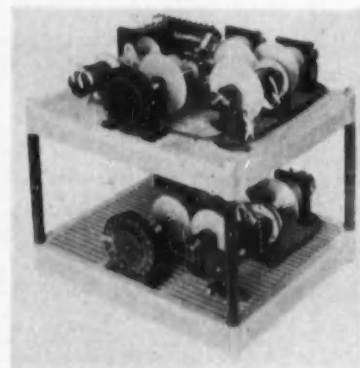
The operator loads the gear to be sound tested in mesh with the master gear and clamps the gear by actu-

ating an air cylinder control. Then he pushes the cycle start button initiating the automatic speeding cycle. The gear is run in one direction in mesh with the master gear. Then a light brake load is applied by an air cylinder. The brake load is removed and the gear is run in mesh in the opposite direction and then a light brake load is applied and the machine stopped.

Individual pushbutton controls are included in the speeders for machine functions to facilitate setup operations. A combination air and electrical control panel is mounted at the rear of the machine. *National Broach & Machine Co.*

Circle 67 on postcard for more data

Mockup System



Instrumentation components including a new design grid base plate and associated parts are available for conducting laboratory breadboards of precision electro-mechanical systems. The grid plate system provides a so-called Erector set method of assembling an infinite variety of experimental instrumentation setups for fire control systems, servomechanisms, electronic computers, etc. A variety of hangers for commonly used servo motors, synchros, potentiometers, etc., are provided as are gears, dial assemblies, differentials, component shaft adapters, electrical and mechanical stops, shafts, and collars. (*Belock Instrument Co.*)

Circle 68 on postcard for more data

Motor-Tachometer

A LINE of d-c motor and d-c tachometer combinations measure only 2 3/8-in. in diameter by up to 5 1/2-in. in length. All combinations are supplied with an auto-reset thermal overload protector built into the motors, with capacitor filters for both motor and generator optionally available.

The line includes units with standard motor outputs of five to 100 watts for speeds to 10,000 rpm, with an operating voltage range of six to 220 v. Both permanent magnet and wound-field types are available, and units for any combination of field and armature voltages can be supplied. *Electric Indicator Co.*

Circle 69 on postcard for more data

Greater Overtravel

AT least 70 deg overtravel in Lox-switch Series L 100 heavy duty limit switches has been provided in



Installation of new Loxswitch.

a new design without the use of cams, levers or extra springs. The switch retains the same trigger-type mechanism. The 70 deg overtravel is provided in either direction of the lever. All models provide isolated circuits with double break contacts. The standard switch (Model L100S) carries a single pole, double throw contact arrangement which may be used as normally open or normally closed in either direction, or as maintained contact in both directions. The switch is also available as a double pole, with both circuits normally closed or normally open (Model L100D); and with a three pole arrangement, two closed, one open, or visa versa. *R. B. Denison Manufacturing Co.*

Circle 70 on postcard for more data

Nickel-Iron Battery

A NICKEL-IRON battery is reported to give 25 per cent more power in approximately the same space as its predecessor battery. All structural cell parts are of nickel or nickel plated steel. It is designed specifically for use in lift trucks. The type MC will usually fit into the battery box made for the C type battery currently in use. In some trucks, alterations are necessary to allow for the MC's 2½-in. greater height.

Rated capacity of a 30-cell MC-8 is 20.52 kw-hr. The design of the MC cell does not deviate from the standard steel tube and pocket construction. The negative pockets are identical with those employed in C-type cells. The positive tubes differ only in that they are slightly shorter. It is rated on the basis of a (normal) five-hour discharge rate at an average of 1.2 v per cell and a final of 1.0 v per cell. Its rated capacity in ampere-hours is five times its normal rate in amperes. It may be charged at its normal rate or at an average of its normal rate throughout. It has no finish-rate limitations and no discharge limits. It is not injured by accident such as reverse-charging or short circuiting and can be laid up indefinitely without injury.

The positive tubes of the battery contain flakes made of pure nickel alternated with layers of nickel hydrate. The negative pockets contain iron. The electrolyte is a solution of caustic potash plus a small percentage of lithium hydrate in distilled water. *Thomas A. Edison, Inc.*

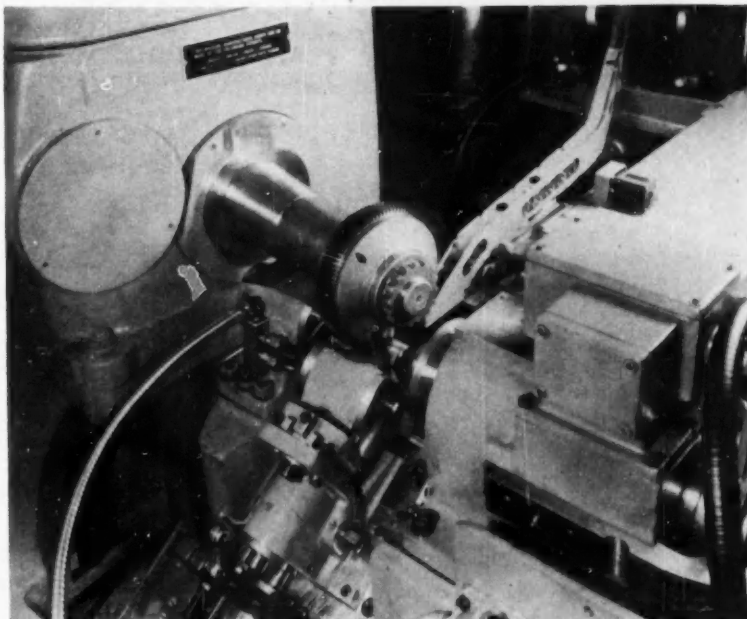
Circle 71 on postcard for more data

Furnace Controller

K NOWN as the model 405, the latest Capacitrol instrument is used in the control of continuous fuel fired process applications which require a true proportional relationship between fuel input and a continuously measured temperature. This model uses the maker's "electronic control principle," and incorporates a modified bridge type control circuit. An integral polarized relay, a component of the feed back circuit, is used as the actuator for a fuel valve power unit. Unbalance causes the valve operator to move in a direction to restore the temperature toward the set point and again bring the electrical bridge into balance.

Incorporated in the instrument is means for manual "droop" correction

Pinions Shaved and Chamfered Automatically



Chamfering of the tips of the teeth of pinions at the same time the teeth are being shaved is accomplished by a recently developed process. The shaving tool is used with a rotary serrated-tooth chamfering tool mounted on an air-powered slide. Complete cycle is automatic. (Fellows Gear Shaper Co.)

Circle 72 on postcard for more data

and proportioning band adjustment. Thermocouple break protection, which will automatically shut off fuel input in case of thermocouple failure or broken thermocouple connections, is

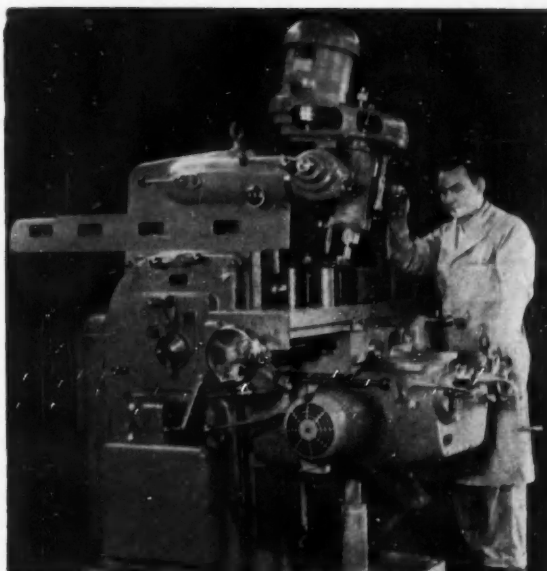
standard. Both the temperature measuring system and control chassis are of plug-in design. *Wheelco Instruments Div., Barber-Colman Co.*

Circle 73 on postcard for more data

Multi-Purpose Milling Machine

A horizontal-vertical-universal milling machine just revealed is a heavy-duty No. 2 or medium-duty No. 3 horizontal mill with a so-called Receptor ram in place of the conventional over-arm. This ram accommodates standard arbor supports and arbor support brace for such operations as slab milling or straddle milling. For face milling, the arbor supports and brace are removed together with the arbor. Then the ram is moved to the rear until its front end is flush with the column face. For vertical or angular milling, the ram remains in the rear position as shown. (Geo. Gorton Machine Co.)

Circle 74 on postcard for more data

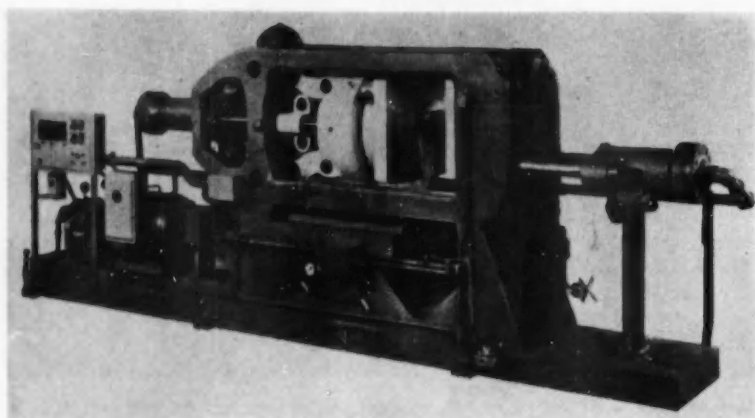


NEW EQUIPMENT

PLANT • PRODUCTION

For additional information, please use postage-free reply card on page 89

Die Casting Machine



Frame of the 400-ton die casting machine is of alloy steel, said to be equal to 6 1/2-in. tie bars.

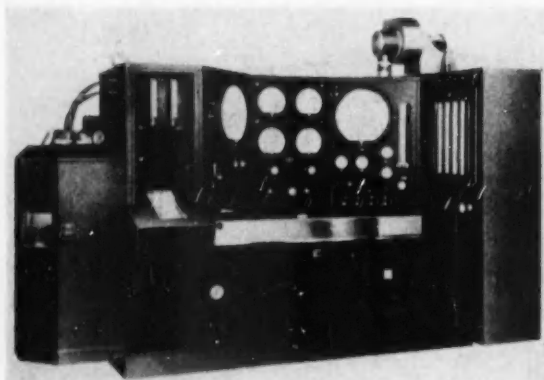
A 400-TON aluminum die casting machine has been introduced to cast up to 6-1/2 lb of aluminum or proportionate weights of magnesium or brass. It is convertible to zinc. The model HP-2 1/2 X-SF is designed to provide 21,000 psi maximum pressure on metal. Both shot speed and pressure are adjustable, with an ASME approved nitrogen accumulator giving high speed injection. The water-cooled plunger tip prevents binding. Two fixed shot positions are provided.

Die set-up is accomplished with a single hand crank die height adjustment. Die opening is 12 in. The unobstructed movable platen is 28 in. wide, with a vertical clearance between the beams of 26 in.

The machine is also offered with a so-called Pre-Fill injection system, which increases the maximum shot pressure to 32,000 psi and also multiplies the shoe speed. *Lester-Phoenix, Inc.*

Circle 75 on postcard for more data

Test Stand Checks Jet Nozzles

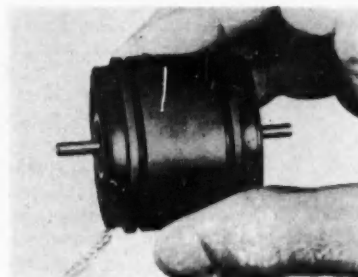


The Cox Type 416 universal fuel nozzle test stand, containing its own supply tank, pumps, filters and temperature control system. It can be supplied with both a high pressure flowmeter and a direct weigh system, or with the flowmeter alone. (*Commercial Research Laboratories, Inc.*)

Circle 76 on postcard for more data

Servo Motor

TWO-PHASE instrument servo motors now on the market feature an integrally molded stator and housing. They presently are offered in ratings of one and five watts, Nos. FPE21L-27-1 and FPE25L-92-1 respectively. High impedance control windings for operation directly from the plates of electron tubes are avail-



Commercial servo motor.

able. The one-watt motor may be controlled with a maximum of three watts since most of the power required is applied to the reference phase. While intended primarily for commercial use, these motors meet pertinent JAN Specifications for resistance to humidity, salt spray, fungus, shock and vibration. They are said to be economically justifiable for an increasing number of applications. *Diehl Manufacturing Co.*

Circle 77 on postcard for more data

Porous Filters

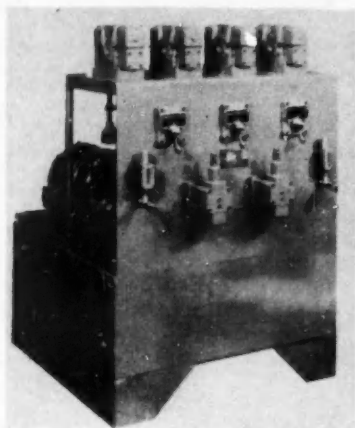
AVAILABILITY of porous Teflon filters for difficult operating conditions is announced. Teflon is chemically inert, high temperature polyfluoroethylene produced by Du Pont. By using a unique sintering and molding process without the aid of any additives or plasticizers, porous Teflon filter medium is being produced which has outstanding corrosion resistance and temperature stability properties.

Porous Teflon has a mean pore size of nine microns and will filter out of liquids all particles having diameters larger than three microns. In gas filtration all particles as small as one micron will be removed. Flow capacities as high as 45 gpm per sq ft of filter at 5 five psi differential pressure can be anticipated for organic fluids of one cp viscosity. This new material is available in disk form in sizes up to 12 in. in diameter, with a solid Teflon rim for high tear strengths. *Porous Plastic Filter Co.*

Circle 78 on postcard for more data

Hydraulic Power Unit

THIS hydraulic power unit was designed for a special machine that drills, taps and mills hydraulic steering housing. It includes powering a Dudco motor, which feeds and turns a tapping head. The unit feeds a milling head, clamps the part and operates a positioning cylinder which in turn, relocates the part for the



Fauver power unit.

tapping, after the drilling operation. Equipment consists of: Dudco PFB-5-100 pumps rated at 2000 psi; two 2-hp electric motors; Double A dust tight solenoid valves, compensated flow controls; pressure controls and check valves; Parker fittings and tubing; 40-gal JIC reservoirs; separate ground motor and pump mounting base. J. N. Fauver Co.

Circle 79 on postcard for more data

Variable Delivery Pumps

DEMANDS for higher variable feeds which will remain accurate over a wide pressure range on machines and processes employing automatic or semiautomatic repetitive motion sequences are said to be met with type JK-10602 and JK-10604 variable delivery feed pumps.

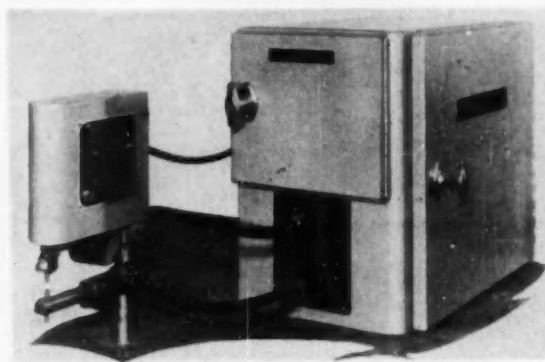
These units are identical type JK-10203 feed pumps in use since 1946. However, the variable delivery radial piston pumps in the new feed pumps are over four times larger in capacity; yet, the mounting and overall unit dimensions are identical.

Adjustable, pre-selected fine and coarse feeds delivered by the new radial piston pump are automatically maintained irrespective of changes in internal leakage due to changes in working pressure. Maximum feeding pressure is 1000 psi. Two sizes of built-in gear pumps for rapid tra-

Control for Small Spot Welders

Electronic welder control for use with manually operated small single-phase a-c spot welders supplies a 1/2-cycle (or less) precisely timed interval of weld current. The remainder of the welder sequence is controlled by other means. Controls and transformer are housed in the one unit. (Taylor-Winfield Corp.)

Circle 80 on postcard for more data



verse purposes are available. Maximum traverse pressure is 300 psi.

Dual, direct solenoid actuated, built-in control valves provide quick and positive control functions in response to remote pushbutton or limit switch control. Full, automatic protection against damage to machine, work or tools is provided in case of power failure. Small switch and control panels operate the pumps. Oil-gear Co.

Circle 81 on postcard for more data

Electric Tow Tractor



Electric Clarkat towing tractor has a normal rated drawbar pull of 600-lb and is available in two models with either 2400-lb or 3000-lb breakaway drawbar pull. Battery is in front of driver over steering assembly. (Clark Equipment Co.)

Circle 82 on postcard for more data

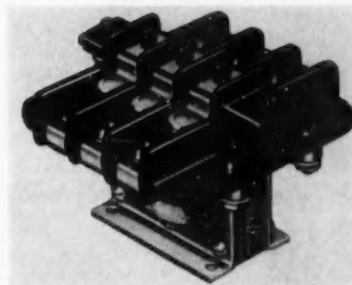
Lift Truck Motor

THE type M lift motor for fork trucks will be standard equipment on new Shipper 20, BF-20, BF-30, and BF-40 models, and will be available for installation in existing BF models, according to a recent announcement. Faster lift speeds are possible by using a higher speed pump motor than formerly used. In addition, on

these same models faster travel speeds and approximately 10 per cent less current consumption are provided. This is accomplished by a more efficient drive motor, called the K motor, and more efficient mating of this motor with drive gear ratio. Automatic Transportation Co.

Circle 83 on postcard for more data

Heavy Duty Relay



An a-c circuit control relay of heavy duty design is said to be capable of handling heavy contact currents with low coil power requirements. Coils are vacuum varnish impregnated. The relay is rated at 30/20 amp, resistive and inductive, at 115/230 vac. (Leach Relay Co.)

Circle 84 on postcard for more data

Heavy Metal

HEAVY Metal, a combination of 95 per cent tungsten and the balance nickel and copper, has a specific gravity range up to 18.2, modulus of elasticity 42,000,000 and tensile strength up to 120,000 psi. It can be machined like gray iron, and is finding use for counterweights, accelerometers, contacts and circuit breakers, flywheels, dies and similar parts for hot extrusion and upsetting. The principal constituent was inadvertently given as titanium in the Nov. 15 issue of A. I. Firth Sterling, Inc.

Circle 85 on postcard for more data

NEW PRODUCTS.

FOR ADDITIONAL INFORMATION, please use postage-free reply card on PAGE 89

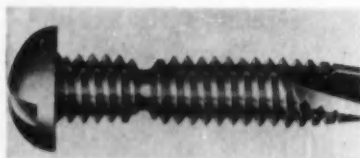


Vinyl Coating Sprayed on Metal

Wrinkle-finish coating with a deep leather grain texture is based on Bakelite vinyl resins for endurance and for a strong grip on metal surfaces. Known as Armorhide, the coating offers very high abrasion resistance. An economical spray-on method of applying the textured coat-

ing was developed for steel or aluminum in thickness of 0.002 up to 0.015 in. in a single application. A finish color coat is sprayed over a vinyl metal conditioner, and baked about 15 min at 350 F. *John L. Armitage & Co.*

Circle 36 on postcard for more data

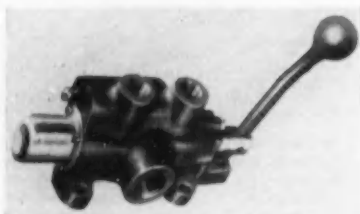


Break-Off Screw for Die Castings

A break-off thread-cutting screw forms a stud in cored holes of die castings. After the screw is driven into the untapped cored hole until it bottoms, torque is increased and the

upper portion of the screw including the head twists off. The head portion may be designed for re-use. *Shakeproof, Div. of Illinois Tool Works.*

Circle 37 on postcard for more data

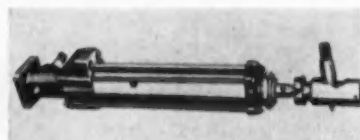


Valve Controls Double-Acting Cylinders

A four-way hydraulic control valve has been designed for double-acting hydraulic cylinders operating loaders, dumps, push-offs, farm implements and similar equipment. It is a pressure balanced sliding spool type. The spool is hardened, ground and chrome plated. The handle can be

mounted on four positions. The model 1260 valve can be used singly or mounted in series for multiple control situations, and is said to be easily adapted to special requirements. It is adjustable from 750 to 1500 psi. *Dukes Co.*

Circle 38 on postcard for more data



Steering Booster for Commercial Vehicles

Series S23 hydraulic power steering booster features compactness as a result of a new servo control valve design and relocated hydraulic con-

nections. It is available either with or without relief valve. It is interchangeable with the S6-270 series, yet has a longer stroke. A symmetrical control ball stud housing can be assembled in any one of four different positions. Models with either seven-in. or 12-in. maximum stroke are offered. Thrust capacity is 3000 lb at 600 psi. *Vickers, Inc.*

Circle 39 on postcard for more data



Suspends Outboard Motors

The Dynaflex mounting, similar in principle to the suspension system used on engines in modern aircraft, is designed to provide the necessary flexibility for vibration isolation at all speeds. At the same time it provides stability for steering. Corrosion protected aluminum alloys and synthetic elastomers used in these

mounts are said to have excellent resistance to water or weathering. *Lord Manufacturing Co.*

Circle 40 on postcard for more data

Free INFORMATION SERVICE

Postage-Free Postcards Are Provided Here for Your Convenience to Obtain **FREE LITERATURE** and Additional Information on **NEW PRODUCTION AND PLANT EQUIPMENT**, AND **NEW PRODUCTS** Described in This Issue of **AUTOMOTIVE INDUSTRIES**. Please Circle Code Numbers of Items in Which You Are Interested, Print Name, etc., and Mail Promptly for Quicker Service.

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FREE LITERATURE

Eccentric Presses 1

Straight side, single action, eccentric geared presses (Series SE-1, 2 and 4) feature crankless eccentric drive; four-piece tie rod frame construction; low inertia pneumatic friction clutch and air releasing brake. Included in bulletin 66 are tabulated specifications for the entire 100 to 1000-ton press line. *Niagara Machine & Tool Works.*

Recorders 2

A general bulletin, DMO35, illustrating the complete line of Metagraphic recording automatic controlling and telemetering instruments, has just been published by *The Bristol Co.*

Wire and Tubing 3

A catalog just released includes 44 pages of information concerning wires and cables, plastic tubing, coated tubing and sleeving, and identification markers which carry the Turbo brand. *William Brand and Co., Inc.*

Small Relay 4

A hermetically sealed miniature relay for aircraft is described in bulletin GEA-6213. *General Electric Co.*

Vibration Controls 5

Catalog 701 describes a variety of Silentblok instrument mounts, machinery mounts, bearings and bushings, as well as special applications to control motion and vibration. *General Tire Industrial Products Div.*

Governors 6

Electro-mechanical load sensing governors for gas or Diesel engine driven generators are described in four-page folder T8500. *Inlet Div., Leach Corp.*

Leaded Steel 7

Rycut 40, a fast machining alloy steel, is described in eight-page bulletin 14-5. *Joseph T. Ryerson & Son, Inc.*

Production Machines 8

Basic types of high-production machines, including a vertical (rear mounted) column type, a center column type for die casting work, the heavy duty revolving trunnion type, the horizontal rotating table type, and the cam fed vertical column type are illustrated in bulletin 77, eight pages, just released. *Morris Machine Tool Co.*

(Please turn page)

12/15/54
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Three-Phase Welders 9

Details of a line of standard commercial SPT 1 and EPT 1 air operated, press type three-phase spot and projection welders, and the ESPT 1 combination projection-spot welder, are given in an eight-page booklet, 825-1. *Sciaky Bros., Inc.*

Blast Cleansing Tips 10

The first issue of a service and engineering bulletin for users of blast cleaning equipment is now available. *American Wheelabrator & Equipment Corp.*

Fastener Line 11

A 32-page catalog describes and pictures the Unbrako line of precision threaded fasteners. *Standard Pressed Steel Co.*

Broach Fixtures 12

Red Ring self-contained air powered bench type broaching fixtures are illustrated in a 12-page catalog, B54-9. *National Broach and Machine Co.*

Epoxy Adhesives 13

Technical data on a number of liquid polymer/epoxy resin combinations are offered in a 16-page booklet of applications, sources of supply, and other information. *Thiokol Chemical Corp.*

Gage Line 14

An expanded line of gage products, including chrome plated gage blocks, sine bars, and other items, is pictured in a 19-page catalog. *Jansson Gage Co.*

USE THIS POSTCARD

Precision Facilities 15

Facilities of the firm for precision machining of aircraft and automotive parts are listed in and illustrated in a bulletin now available from *Crescent Manufacturing Co.*

Data Processing 16

A general catalog of data processing instruments, which range from miniature transducers to entire instrumentation systems, are pictured and described in bulletin CEC-1301. *Consolidated Engineering Corp.*

Dynamometers 17

Hi-Eff hydraulic dynamometers of the power absorption type, in 100 models varying from fractional to 7500 hp, 0 to 25,000 rpm, are outlined briefly in a four-page bulletin, 761. *Taylor Dynamometer & Machine Co.*

Controller 18

The series 400 Capacitrol indicating controller is outlined and pictured in eight-page bulletin F-6314. *Wheeloo Instruments Div., Barber-Colman Co.*

Milling Line 19

Highlights of the Toolmaster line of milling machines just introduced are pictured and explained in a 20-page brochure, M-1870. These machines come in three styles: manual feed to quill, power feed to quill, and heavy duty head. *Cincinnati Milling Machine Co.*

Automatic Milling 20

The production type Mill-Matic is hydraulically operated with push-button electrical controls. Machine and typical tooling pictured in eight-page booklet. *Producto Machine Co.*

Instrumentation 21

A general catalog illustrates process instrumentation, including flow meters, pressure, temperature, liquid level, density, specific gravity instruments, and others, for recording and controlling. *Fischer & Porter Co.*

Machine Modernizing

How a heavy duty planer was converted to a skin mill for aircraft production is featured in issue No. 4 of the *Simmons Way*. Write to *Simmons Machine Tool Corp., 1701 Broadway, Albany, N. Y.*

(Turn to page 146, please)

HERE'S PROOF: You can always count on Continental
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Only Continental Specializes in Special Fasteners

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50th Anniversary

CONTINENTAL SCREW COMPANY

New Bedford, Mass., U. S. A.

Upholstery Items Produced by New Embossing Method



Dielectric trim panel assembly is handled in presses such as this one, rated 25-ton capacity, equipped with a 25,000-watt high frequency source.



This is a 300-ton, "hot" press for curing seat panels and seat backs where foam rubber is employed.

INFORMATION on its new technique—embossing—for the assembly of such items as door panels, seat cushion and seat back covering has been released by Fisher Body Division, General Motors Corp. Embossing employs special adhesives which are cured under heat and pressure in special presses, discarding the older methods of machine sewing.

Trim items produced by the press method are being supplied on certain models of all makes of General Motors cars announced for the 1955 season.

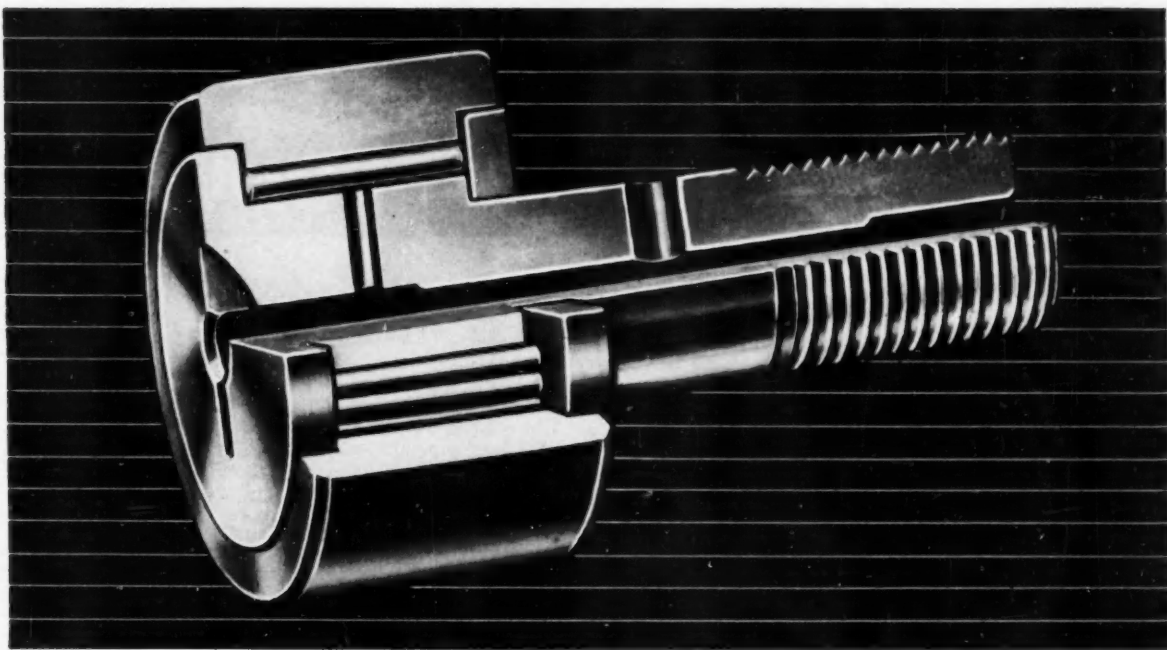
Two different methods are being employed in the embossing of trim panels, depending upon the character of the assembly. Cushion trim materials, including flexible foam rubber backings, are embossed in presses such as the hydraulic press, illustrated here. These are equipped with electrically heated platens, the die being mounted on the lower platen. Latex is used as the bonding agent as well as to retain the depressed pattern in the foam rubber.

This is a 300-ton press, providing pressures up to 1500 psi on the embossed area. The die is heated to 175 F, while the flat back-up platen is held at a temperature of 340 F.

Door trim panels, on the other hand, are assembled by a dielectric heating process, in a special press such as the one shown here. Cloth, leather, and imitation leathers are pattern bonded to a foundation board through a tufted paper riser, using a phenolic plastic adhesive, cured under heat and pressure. This riser material is available commercially with a film of the plastic on it, hence does not require further spraying of adhesive at assembly.

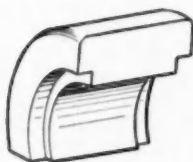
In the dielectric process, heat is developed within the assembly by subjecting it to a high frequency current, employing a 25,000-watt high frequency source from the cabinets seen on the right hand side of the press. The press, rated 25-ton capacity, provides a pressure of around 400-psi on the die.

The new process is said to provide for greater flexibility of trim design, since the patterns are not limited to lines of one width or an untextured appearance as in sewing. In addition, productivity is considerably higher, with possibilities of improved manufacturing economies.



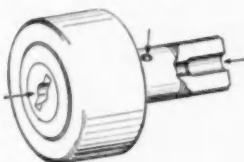
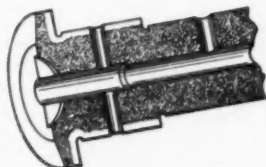
TORRINGTON CAM FOLLOWERS

Give Longer Service... Carry High Shock Loads



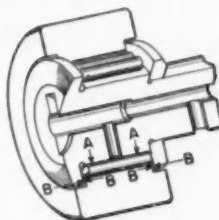
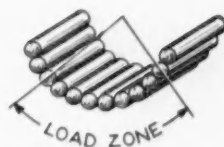
1. Heavy sectioned outer race of hardened and ground high carbon chrome steel assures uniform distribution of high rolling and shock loads while providing high capacity anti-friction performance.

2. Integral stud for cantilever mounting is made of case hardened and ground low carbon nickel molybdenum steel. The tough core provides high strength to withstand high shock loads.



3. Easily relubricated at any one of three points—at either end or through cross hole in stud. Ends accommodate standard drive grease fittings, or may be sealed by the plugs provided.

4. Full complement of small diameter rollers—through-hardened, ground and lapped—for maximum radial load capacity.



5. Raceways precision ground for even load distribution (A) and uniform low end play (B) assure long bearing life.

Torrington Cam Followers are precision made throughout. They are available in sizes from $\frac{1}{2}$ " to $2\frac{1}{4}$ " O.D. Special surface finishes such as chrome and cadmium plate or oxide black can be provided.

Our Engineering Department will be glad to work with you in adapting these dependable and efficient Cam Followers to your cam-controlled or track-type equipment. Torrington Cam Followers give better service because they're better made.

THE TORRINGTON COMPANY

Torrington, Conn.

South Bend 21, Ind.

*District Offices and Distributors in Principal Cities
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TORRINGTON NEEDLE BEARINGS

Needle • Spherical Roller • Tapered Roller • Cylindrical Roller • Ball • Needle Rollers

AUTOMOTIVE INDUSTRIES, December 15, 1954

93

NEW



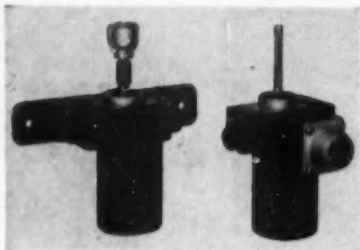
AIRCRAFT PRODUCTS

FOR ADDITIONAL INFORMATION, please use postage-free reply card on PAGE 89

Small Motors

Three styles of miniature electric motors for use in actuators or for other high speed applications are now available.

Motor No. 452008 is a split series



type 24-v dc, or 110-v ac, rated at 2.5 oz-in. for intermittent duty to 160 F. The motor is available for unirotational and reversible operation and can be supplied with or without integral filter. Weight is 13 oz and the overall dimensions are 3 by 3 by 2 1/2 in.

A "square" motor type No. 1007690 designed to AN-M-40 and MIL-E-5272 is rated at four oz-in. torque, intermittent duty to 165 F. This is a split series 24-v dc motor. It is available for unirotational or reversible operation and with or without a magnetic brake. Size is one in. square by two in. long. The model is also manufactured for use in ambients up to 275 F.

A third motor No. 406046 is a shut field type 24-v d-c, unirotational only. It is rated at 1 oz-in. for continuous duty to 160 F. The motor incorporates thermistors in the field to compensate for temperature effect on motor speed. Weight is 13 oz. *Pacific Div., Bendix Aviation Corp.*

Circle 46 on postcard for more data

Drain Valves

A series of drain valves for general aircraft use recently announced conform to Specification AF28208 for fuel drain valves. The valves are listed as suitable for all types of avi-

ation fuels including JP-4, as well as other fluids used in aircraft systems, including hydraulic fluid, engine oils, water, de-icing fluid, air and gases. They are available in 60 different combinations of inlet and outlet fittings in AN standard types and sizes for tube, pipe and hose connections. *Aircraft Div., Clary Multiplier Corp.*

Circle 47 on postcard for more data

Toggle Switch Line

A line of toggle switches to meet Standard AN-3021, to Specification MIL-S-6745 is now in production. Furnished with a Bakelite base, the switches are approximately 1 1/2-in.



long, 5/8-in. wide and 1 3/4-in. high from the bottom of the sleeve to the terminals. The sleeve, which is stated to be both sand and dustproof, is 15/32-in. long. Steel parts of the new line of switches are cadmium plated, while all current-carrying parts are silver plated. All finishes on the slow make and break switches will withstand 100-hr salt spray tests, according to the maker.

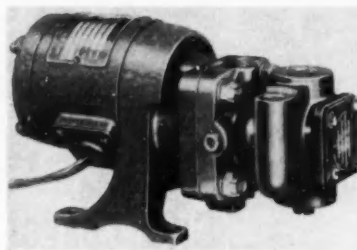
Commercial equivalents of the aircraft toggle switches are also available for use as a component by original equipment manufacturers. These commercial equivalents are listed as standard by Underwriters' Laboratories. *Arrow-Hart & Hegeman Electric Co.*

Circle 48 on postcard for more data

Coolant Pump

The Model RG-9860-D is designed for circulating ethylene glycol at high temperatures and pressures in air-

craft accessory cooling systems. Continuous duty motor is 1/4 hp, 208-v a-c, 400 cps, three phase, 1.5 ampere. Pump capacity is 1.45 gpm at 140 psi discharge pressure, pumping a mixture of 60 per cent glycol and 40



per cent water at 185 F, with excellent performance from sea level to 50,000 ft.

The built-in relief valve has a preset cracking pressure of 150 psi. When the valve is open, excess liquid bypasses internally to the inlet side of the rotary vane element. This element has four sliding blades and is positive displacement type. The developed bore of the element prevents the blades from sliding in their rotor slots when under load and also provides a non-pulsating discharge even at high pressure, because the area of the displacement chamber has the same uniform dimensions between the inlet and discharge port. *Lear, Inc.*

Circle 49 on postcard for more data

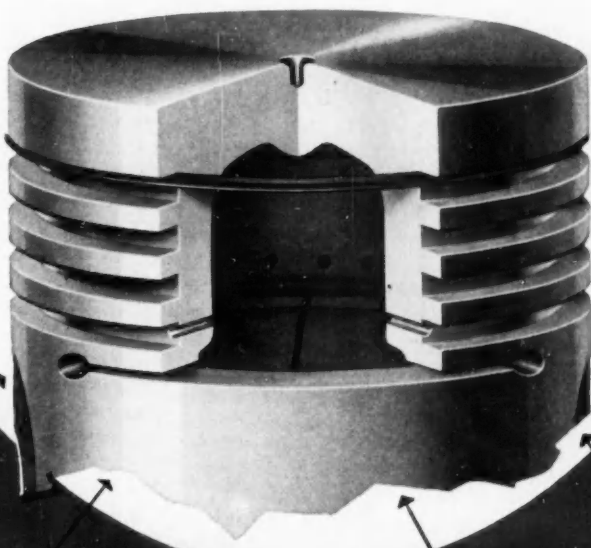
Hydraulic O-Ring

Temperature range of a line of O-rings just introduced is minus 65 F to plus 300 F. The new rubber material for this O-ring is designated compound No. 590-5, to meet MIL-P-5516A and MIL-P-18017. After 50,000 cycles in MIL-O-5606 fluid at 300 F, this new compound showed no appreciable deterioration. O-rings in all standard sizes will be molded. *Rubber Products Div., Parker Appliance Co.*

Circle 50 on postcard for more data

Adopted by leading engine builders

...for original equipment... for service departments



Sealed Power GI-60 Groove Insert

INCREASES PISTON LIFE TO AS MUCH AS 200,000 MILES!

Pioneered by Sealed Power engineers and proved by experience to be the only dependable, economical answer to top-ring-groove wear, Sealed Power GI-60 Contracting Groove Insert is steadily gaining in popularity with engine manufacturers.

They can't ignore the testimony of fleet owners who have reported that GI-60 has increased *average piston life* to over 200,000 in the roughest kind of service. Several engine builders now make GI-60 standard equipment in new engines. Others are using it in replacement pistons.

Sealed Power GI-60 is a heat-treated spring-steel insert, securely anchored to the top of the

ring groove after regrooving to a true surface $1/32$ " wider than before. A $1/32$ " recess is then cut at the top and the insert locks itself permanently into place, held by its own inward tension and dished to hug the top of the groove.

This armor-plate protection gives the top ring groove protection it can't get in any other way. This groove is to the hottest, least-lubricated spot in the piston. GI-60 resists the pounding, the heat, and the friction far better than aluminum or cast iron possibly can. That's why it adds thousands of miles of life to both new and replacement pistons... "makes old pistons new, keeps new pistons young."

Sealed Power Corporation

MUSKEGON, MICHIGAN

Sole manufacturers of KromeX Ring Sets, MD-50 Steel Oil Ring, Full-Flow Spring, Flex-5 Flexible Oil Ring, and GI-60 Groove Insert. Leading producer of Automatic Transmission Rings, Power Steering Rings, and Non-Spin Oil Rings

The BUSINESS PULSE

Manufacturers' Inventories Rise for First Time Since Late Summer of 1953. Continued Sharp Expansion in Construction to 39½ Billion Foreseen. General Customer Demand Still Is an Uncertain Factor.

This Survey Is Prepared
Exclusively for AUTOMOTIVE
INDUSTRIES by the Guaranty
Trust Company of New York.

Higher Steel Production

Business has picked up considerable momentum with the resumption of large-scale automobile output, and for the first time since early 1953 it appears to be rising at a more-than-seasonal rate.

The big question, of course, is whether the economy has now entered upon a period of sustained revival. Unfortunately, no categorical answer is possible, for the evidence is mixed, as usual.

One of the most encouraging developments of recent weeks with a bearing on this question has been the continued uptrend in steel activity. What is significant is that this uptrend does not seem to be simply the result of automobile demand but rather appears to owe a good deal to a revival of purchasing by a broad range of other industries as well. This broadening of demand has been interpreted as a pretty reliable indication that the phase of inventory liquidation in steel-consuming industries is at an end. Present indications are that the uptrend in the production rate will continue at least into the beginning of the new year. Indeed, observers incline to the view that a steady cycle of improvement is now probable. For 1955 as a whole, Benjiman F. Fairless, U. S. Steel chairman, forecasts a gain of from five to 10 million tons above this year's expected output of 86 million tons. He asserts that this can be expected even if there is no rebuilding of steel inventories from present levels. Others, who think inventory paring was carried too far, have projected the 1955 performance at a higher level.

There is also pretty substantial evidence indicating that general inventory liquidation, after a number of premature "all-clears," is at or near its end. October statistics, the latest available, show the first rise in manufacturers' inventories since the late summer of 1953. The October rise was small, to be sure, but the reversal of trend seems significant.

More Defense Orders

Another occurrence that suggests a possible strengthening of the business trend has been an increase in the rate of order placement by the Defense Department during the recent past. It appears to have been largely owing to this gain that manufacturers' new orders rose above shipments in September and October for the first time in almost two years. This development has been interpreted by some observers as evidence that the decline in military spending also is over. Others, however, point out that pressure for further reduction is still very strong in view of the prospective budgetary deficit of \$4.7 billion for the current fiscal year. Of course, if the decline in military spending has really been halted and if inventory liquidation is indeed at an end, then prospects for sustained revival of general business are most assuredly enhanced, since these two factors of readjustment were the principal recessionary influences during the phase of business decline.

Increasing New Construction Activity

Optimism regarding the business outlook has been further bolstered by the Government's recent forecast that spending for new construction in 1955 will undergo continued sharp expansion. The remarkable pace of building activity in recent months and the exceedingly high contract-award figures had suggested the possibility of an uptrend at least in the early part of next year, but the prediction of an increase of seven per cent to \$39½ billion probably came as a surprise to most observers. This would be even sharper than the gain from 1953 to 1954.

Over against these favorable considerations are certain questionable aspects of the present situation which must also be weighed in an objective review. The most significant of these relate to the automobile situation and general consumer demand.

Automobile Production

The fact that business is now rising at a more-than-seasonal pace, whereas earlier gains were no more

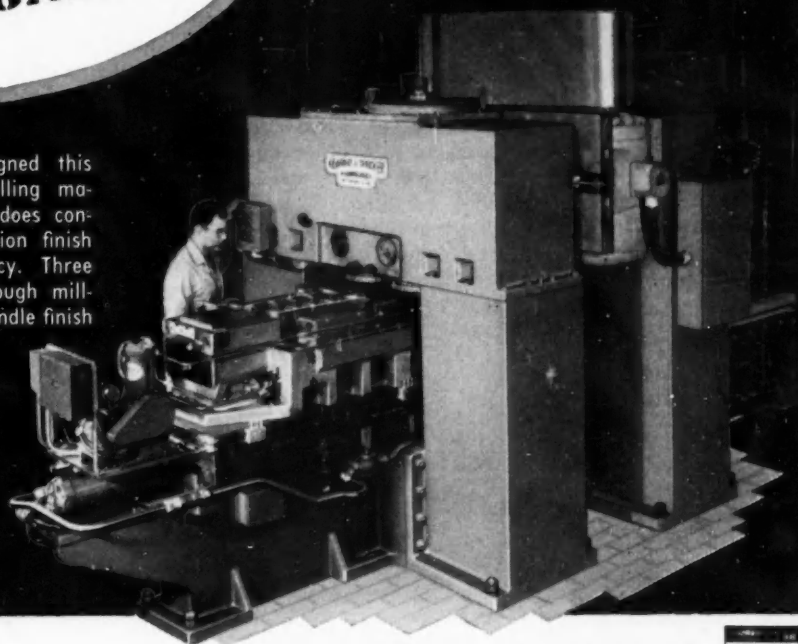
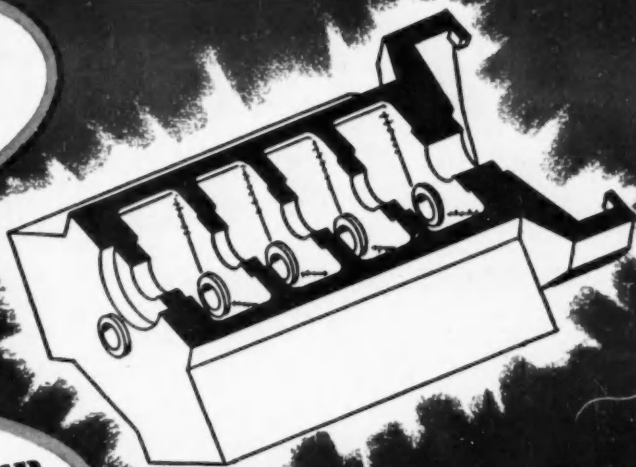
(Turn to page 168, please)

**CUSTOMER
SPECIFIED**

To increase production of V-8 engine blocks, a large automotive manufacturer specified a three-spindle, production milling machine for rough and finish milling of pan and rim and bearing bores.

**KEARNEY & TRECKER
DESIGNED**

Kearney & Trecker designed this six-spindle production milling machine as the answer. It does continuous rough and precision finish milling to .001" accuracy. Three front spindles perform rough milling. Three rear spindles handle finish milling. Close tolerances are essential because all later machining depends on this machine's accuracy. A rapid-action hydraulic locating and clamping fixture is another outstanding feature.



New production efficiency starts with Kearney & Trecker production machines

This typical example proves you can reduce costs and start on the road to higher production with machines designed and built by Kearney & Trecker's Special Machinery Division. With more than 50 years' experience in machine design and manufacture, Kearney & Trecker has all the ingenuity and skill re-

quired to solve special machining and production problems.

Why don't you take advantage of our abilities? They can pay off in profits for you. Your Kearney & Trecker Special Machinery Division representative will be pleased to give you all details. Call him today!

For more details on the machine illustrated ask for Data Sheet No. 1048. Free booklet "Doorway to a proven method for solution of big and small metalworking problems" is also yours for the asking.





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MILWAUKEE
MACHINE TOOLS**

Special Machinery Division

MILWAUKEE 14, WISCONSIN, U.S.A.

Builders of Precision and Production Machine Tools Since 1898

AIR BRIEFS



By **ROBERT McLARREN**

Half-Billion Tooling

The aircraft manufacturing industry needs at least \$500 million worth of new tooling in order to be prepared for an emergency mobilization, according to the Machine Tool Panel of the Aircraft Industries Association. After a two-year study, the Panel finds that the aircraft industry is equipped largely with early World War II tooling wholly inadequate for the job of producing modern, high speed aircraft. The Panel has prepared specifications for the new tools required and will submit them to the machine tool industry early next year. The industry sorely needs a major reduction in the variety of the machine tools it uses, increased ranges of feeds, speeds and powers; simplified setup procedures and simplified machine adjustments during production. The new requirements are based wholly on available knowledge for immediate use and do not require any research program to permit the start of tool design.

Tool Purchasing

A method by which the aircraft industry could purchase the new tools required has been outlined by Roy Hurley, Curtiss-Wright president, who points out that advanced machine tools offer substantial production savings. A study of one part of the company's J65 turbojet engine reveals that the purchase of a \$400,000 machine tool would result in a price reduction for the part from \$28 to \$11, a saving of \$1 million over a full year of production of the part. Hurley believes, therefore, that part of such saving be allowed the company towards purchase of the tool through a five-year amortization and the use of target-incentive type production contracts.

Civil Aircraft Outlook

The Air Coordinating Committee estimates that 845 non-carrier (industrial, business and agricultural) aircraft will be produced during the last quarter of this year. Estimates for next year are 4370 aircraft and 4498 during 1956. The steady increase should continue through the first quarter of 1957, according to the Committee.

New Air Force Phase

Roger Lewis, Assistant Secretary of Air Force for Materiel, states that the Air Force has now passed beyond the traditional policy of buying minor technical improvements in existing weapons and now is gearing its procurement philosophy to the purchase of major and rapid developments in performance and combat capability. Under this approach, the Air Force will concentrate more on experimental work and the thorough testing of new weapons in the field prior to ordering them into quantity production. Thus, the engineer will be relieved—in the early stages of a new product—of keeping one eye on its producibility and will concentrate, instead, on the rapid development of entirely untried design ideas.

B-52 Production

The Air Force has chosen the Boeing B-52 as its standard heavy bomber for the next generation of aircraft and has scheduled a striking force of 11 groups of B-52 eight-jet bombers for the future. The B-52 will replace the Convair B-36 as our intercontinental "big stick." Secretary of Air Force Harold Talbott reveals that the present B-52 has a range of only about 6000 miles on its own fuel but states that aerial refueling tankers are a fundamental part of the intercontinental weapons system and provide vastly increased range. Air Force has awarded Boeing a \$306 million contract for initiation of production at the company's Seattle, Wash. and Wichita, Kans. facilities.

Engine Contracts

Both the Air Force and the Navy have been forced to cancel production contracts due to continuing engine difficulties. The Navy has cancelled \$135 million worth of McDonnell F3H-2 aircraft and \$75 million worth of Vought A2U-1 aircraft, together with \$75 million worth of Westinghouse J46 turbojet engines and \$36 million worth of Allison J71 turbojet engines. The Westinghouse engine was to be used in the Vought fighter, the Allison engine in the McDonnell fighter but delays in the engine development programs have caused cancellation of the engines and aircraft. McDonnell still has a substantial production program

(Turn to page 170, please)



POWER LINES ARE VULNERABLE

Wherever there may be a tornado, earthquake, flood or other disaster the saving of many lives and millions in property damage can be accomplished by fast restoration of power.

Within SECONDS of power failure Synchro-Start Controls activate any stand-by engine to produce emergency power for vital utilities such as, fire protection, communications, light and refrigeration. When main line power is restored the controls quickly transfer the load.

Synchro-Start, being a pioneer in the field of automatic control, has highly engineered and tested each and every product to give the utmost in quality and performance. Send in your specifications or problem and the Synchro-Start engineers can recommend the proper control for your installation.

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STARTER CONTACTORS ☐

FULL AUTOMATIC CONTROL SETS ☐

ENGINE MAKE AND MODEL _____

TO _____

COMPANY _____

ADDRESS _____

Station Wagon Popularity Continues to Increase

IMPRESSIVE gains in popularity are being registered by the versatile station wagon, and the present boom in sales may well make 1954 a record year for the production of this type of vehicle, barring unforeseeable conditions.

There has been an amazing surge in station wagons within the last decade. Back in 1946 a little more than 31,000 such body styles were produced, although most car makers offered them. In 1947, there were 81,973 units produced. This jumped to 159,944 in 1950 and to 195,740 the following year. Last year a record 318,178 was turned out, and output so far this year is running well ahead of the same time last year. Heavy demand for the utilitarian vehicle has made several car makers raise their production sights for the remainder of the year.

Just what is the explanation for the popularity of the vehicle, whose sales before World War II never rose above a fraction of one per cent of total production in the industry? Various reasons have been advanced for the unprecedented demand for this type of body. Two of the biggest factors are dispersed shopping centers, which have been cropping up all over the country, and the increasing number of families with young children. The accelerated increase in suburban living has also been credited with the spurt in station wagon demand.

When first introduced, the station wagon was used principally by business firms to meet incoming trains at the station and deliver passengers to hotels and other local destinations. Since then, the flexible vehicle has undergone such transformation that today it serves innumerable purposes.

Today's station wagon can be converted into a traveling apartment house, mobile bedroom, a "bus" for transporting school children and myriad other uses. It has won wide popularity among hunters, campers, and sports enthusiasts, who can use the spacious interior for bulky equipment, boats and emergency sleeping accommodations. Those

living out of the city who have to do more of their own hauling are also among the biggest users of the vehicle. The Do-It-Yourself trend has been credited by the industry for increased sales of station wagons. The suburban homeowner is more likely to be a handyman who needs a vehicle in which he can carry tools and materials, and the station wagon has been the answer.

Many business concerns are slowly replacing their two-door coupes with station wagons, despite the higher cost of the latter. One big corporation recently purchased a fleet of station wagons for its salesmen instead of coupes which it had been using for sales purposes for years.

Plymouth was said to be the first to penetrate the business field when it introduced the low priced Suburban without the extra luxury frills, in 1949. Others have since jumped on the station bandwagon with similar types of units. Small businessmen such as florists, grocers, television repair firms and painters, among others, have found the station wagon ideal for transporting goods, and many now prefer the utility vehicle over a small panel delivery truck because of its versatility for business and pleasure.

Folding seats and all-steel bodies have influenced sales. Wood bodies, which prevailed in 1941, started to drop out of the picture after the war and manufacturers began to concentrate on all-steel bodies. The wood body was found impractical because of rapid deterioration by the elements.

While many motorists have been adding the station wagon as a "second car" in the family, one manufacturer

(Turn to page 118, please)

Year	Station Wagons Passenger Car Chassis Total	Station Wagons Truck Chassis Total	Grand Total Car and Truck Chassis
1932	1,406	*	*
1933	2,054	40	2,094
1934	2,897	175	3,072
1935	4,551	556	5,107
1936	6,372	1,020	7,392
1937	9,983	4,055	14,038
1938	9,075	2,701	11,776
1939	17,331	2,573	19,904
1940	24,677	3,455	28,132
1941	30,961	5,048	36,009
1946	28,757	2,608	31,365
1947	79,766	2,207	81,973
1948	102,463	7,849	110,312
1949	90,983	13,630	104,613
1950	141,697	18,247	159,944
1951	178,689	17,051	195,740
1952	169,036	20,615	189,651
1953	297,393	20,785	318,178
1954 (6 mos.)	186,992	6,630	193,622

* Not available.

Source: Automobile Manufacturers Association.

first choice



for modern cars, trucks and tractors

"No Kick-Out" feature combines new starting efficiency with proven economy

• Higher compression ratios, lighter flywheels and other advancements in modern engines have long pointed up the need of a starter drive that would follow through the weak explosions until the engine actually runs on its own power.

That's why vehicle manufacturers are turning in ever increasing numbers to the Bendix® Folo-Thru Drive as the solution to quicker and more dependable starting even under most adverse conditions.

This preference for the Bendix Folo-Thru Drive on modern vehicles is a most logical one, for Bendix Drives have always been the industry's choice as the most economical and efficient starting equipment.

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costs less. Like the more than 95,000,000 Bendix® Starter Drives manufactured for the industry, the new Folo-Thru Drive requires no actuating linkage and the solenoid may be placed in any convenient position. Result is lower installation costs and no adjustments. Complete detailed information is available on request.

Bendix® Folo-Thru Starter Drive



Bendix® Automotive Electric Fuel Pump



Stromberg® Carburetor



U.S. AUTOMOBILES

Find Ready Market in Venezuela

CARACAS, VENEZUELA

Two large assembly plants, located in the outskirts of Caracas, are producing a high percentage of popular American model cars and trucks, to help satisfy an ever-increasing demand in the Venezuelan market. General Motors, operating through its wholly owned subsidiary, is producing everything from Chevrolets to Cadillacs in its daily output of 40 units, while Ensamblaje Venezolana, on license from the Chrysler Corp., turns out an average of 25 cars and trucks per working day.

General Motors entered the field first, early in 1949, and has a plant with approximately 250,000 sq ft of floor space. Ensamblaje Venezolana, controlled entirely by Venezuela's Chrysler distributors, began operations in October of 1950 in a plant containing 100,000 sq ft of assembly floor space.

The General Motors plant last year assembled 6600 vehicles, while Ensamblaje Venezolana put together 5100 units of the Chrysler line. The total number of American cars and trucks sold in the Venezuelan market came to 34,000 in 1953. Chevrolet is the top-selling car in Venezuela; its lowest priced model costing \$3000. The small Cadillac costs slightly over \$6000. Prices generally are the same for vehicles imported as for those assembled in Venezuela. A De Soto station wagon costs about \$5000 while a Dodge 3½-ton truck (stake body) costs \$3970.

Approximately 75 per cent of the General Motors vehicles sold in Venezuela nowadays are locally assembled. The plant does not produce coupes, two-door sedans or convertibles, or the large Cadillac; as the market for these items is limited. The current General Motors expansion program will increase factory space

by 20 per cent and change many manual operations to automatic ones. It is calculated that this will raise the percentage of locally assembled cars to 90 per cent of GM's total sales in the future.

Of all Chrysler products sold in Venezuela, 85 per cent

(Turn to page 115, please)



General Motors assembly plant in Caracas



Assembly lines in the Chrysler-licensed plant



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streamline production
of
LARGE STAMPINGS

Clearing triple, double and single action underdrive presses streamline production of large stampings by dividing manufacturing functions to two floor levels. Uninterrupted flow of in-process material takes place at the upper level, while scrap disposal and equipment servicing is accomplished below.

Clearing underdrives designed with the new Clearomatic clutch make it possible to double

the operating speed of the press in comparison to conventional methods. *Clearing Productivity Consultants, men who have direct experience with this kind of highly productive installation, are ready to help you plan a streamlined metal-forming operation. Let them discuss with you the new concept of productivity made possible with Clearing equipment. Call or write for complete information, without obligation.

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News of the AUTOMOTIVE AND AVIATION INDUSTRIES

Continued from Page 39

AMC Exhibit Depicts Worldwide Operations

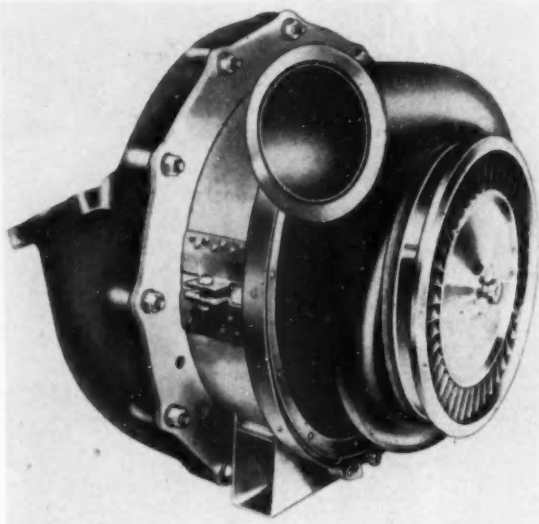
The exhibit held by American Motors Corp. this month in Chicago, New York and Detroit exemplifies partly the aggressive plans the corporation has for the future. It brought together for the first time the diversified range of products produced by the various AMC automotive as well as non-automotive divisions.

Called the "All American Motors Show," the exhibit, which will be put on at several other major cities throughout the country, graphically tells the story of AMC's worldwide operations. For example, one display shows the integral part AMC's appliance division, the \$100 million Refrigeration Discount Corp., plays in the company's operations.

Displayed are more than 100 refrigeration and automotive temperature controls, supplied by Rance, Inc., AMC's subsidiary in Columbus, Ohio. The newly-formed Hudson Special Products Div. of AMC has on display the new military vehicle "Mighty Mite," which the corporation hopes to be producing soon. AMC recently acquired exclusive manufacturing and sales rights for the vehicle from Mid-America Research Corp. A working model of AMC's air conditioning

SUPER-CHARGER

Shown here is a turbo-supercharger designed and developed by Aircooled Motors, Inc., for their Franklin 0-425-13 engine (see *AI*, Aug. 15, 1954, p. 72). It will supply 40 in. of mercury absolute pressure at carburetor inlet up to 16,000 ft altitude. The 36-lb unit is said to adaptable for engines up to 400 hp and with modifications to engines of 200 hp.



system for cars is likewise featured.

There is also a display which links the series of events preceding the merger of American Motors, including the founding of the Seaman Co. in Milwaukee in 1846. Other exhibits point out technical advances made on various products turned out by AMC.

Gray Iron Founders Elect New Officers

C. H. Ker, president, the Dalton Foundries, Inc., was elected president of The Gray Iron Founders' Society

at a recent annual meeting. Named vice-president was J. W. Simmons, Jr., secretary-treasurer, Cox Foundry & Machine Co.

C. H. Meminger, manager, the Foundry Div., Posey Iron Works, Inc., was elected secretary. The incumbent treasurer, W. O. Larson, president, W. O. Larson Foundry Co., was re-elected.

H. L. Edinger, president, Barnett Foundry & Machine Co., was honored by being presented with the Society's Gold Medal.

(Turn to page 176, please)

NEW ENGLAND AREA ONLY ONE TO SHOW GAIN IN SEPTEMBER OVER AUGUST

Regional Sales of New Passenger Cars

Zone	Region	September			Nine Months		Per Cent Change		
		1954	August 1954	September 1953	1954	1953	Sept. over August	Sept. over Sept. 1953	Nine Months 1954 over 1953
1	New England	24,566	24,196	24,540	252,540	251,071	+ 1.53	+ .11	+ .59
2	Middle Atlantic	77,333	87,765	89,294	806,436	843,043	- 11.89	- 13.40	- 4.34
3	South Atlantic	49,218	54,184	53,375	489,102	494,893	- 9.11	- 7.79	- 1.17
4	East North Central	100,387	109,667	117,820	1,050,776	1,143,907	- 8.46	- 14.80	- 8.14
5	East South Central	21,350	21,600	20,504	204,107	205,048	- 1.16	+ 4.13	- .66
6	West North Central	39,609	44,267	45,697	409,697	441,835	- 10.52	- 13.70	- 7.27
7	West South Central	40,751	42,781	39,185	400,285	395,205	- 4.75	+ 4.60	+ 1.29
8	Mountain	13,936	14,342	13,595	125,682	139,327	- 2.83	+ 2.51	- 9.79
9	Pacific	40,694	41,540	49,586	398,865	455,715	- 2.04	- 17.95	- 12.47
	Location Not Determinable				1,782				
Total—United States		467,844	440,312	453,506	4,139,272	4,370,044	- 7.37	- 10.13	- 5.28

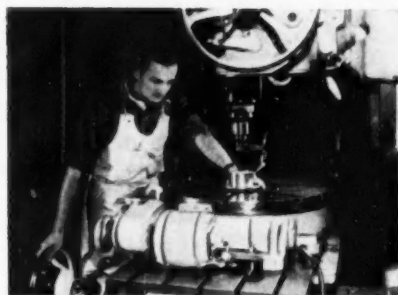
States comprising the various regions are: Zone 1: Conn., Me., Mass., N. H., R. I., Vt.—Zone 2: N. J., N. Y., Pa.—Zone 3: Del., D. C., Fla., Ga., Md., N. C., S. C., Va., W. Va.—Zone 4: Ill., Ind., Mich., Ohio, Wis.—Zone 5: Ala., Ky., Miss., Tenn.—Zone 6: Iowa, Kan., Minn., Mo., Neb., N. D., S. D.—Zone 7: Ark., La., Okla., Tex.—Zone 8: Ariz., Colo., Ida., Mont., Nev., N. M., Utah, Wyo.—Zone 9: Cal., Ore., Wash.

POWER...FOR TRANSONIC GUNNERY TRAINING!

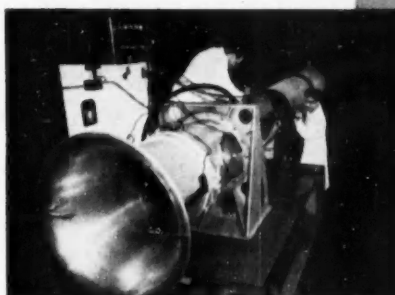
Fairchild's J44 Turbojet, designed for powering remotely controlled drones and missiles, is in production for the U. S. Navy to provide much-needed gunnery training with transonic targets for the major military services.

The J44 is a low-cost, easy to maintain engine capable of repeated flights and long-service-life. Its rugged construction withstands repeated launchings from ground cradles, shipboard catapults or from mother planes in the air.

Creative thinking and advanced design techniques incorporated in the J44 and other turbojets, as well as new type propulsion systems for underwater ordnance, keep the Fairchild Engine Division in the forefront of powerplant development.



Efficient production design of the J44 Turbojet requires only standard tooling—means economical production.



In actual service the J44 has demonstrated performance far in excess of original engineered service life.



Fairchild Engine specialists have years of experience in powerplant design and manufacturing.



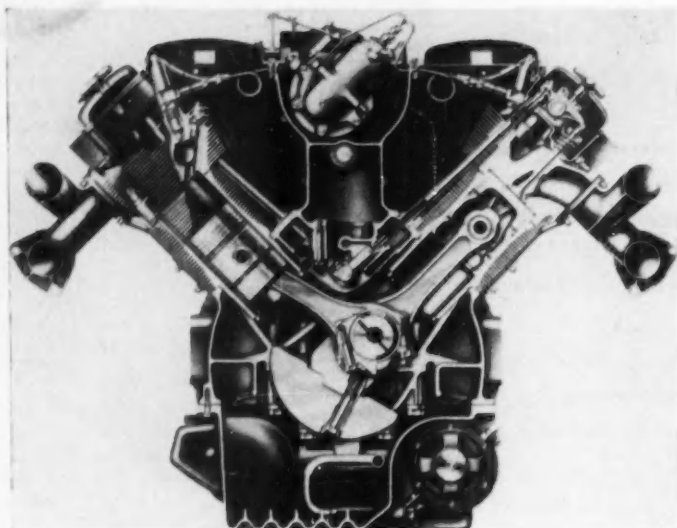
The simplicity of the J44 construction means easy field maintenance using only standard equipment.

Fairchild J44 Turbojets have completed hundreds of operational flights in swept-wing Ryan Firebee target drones.

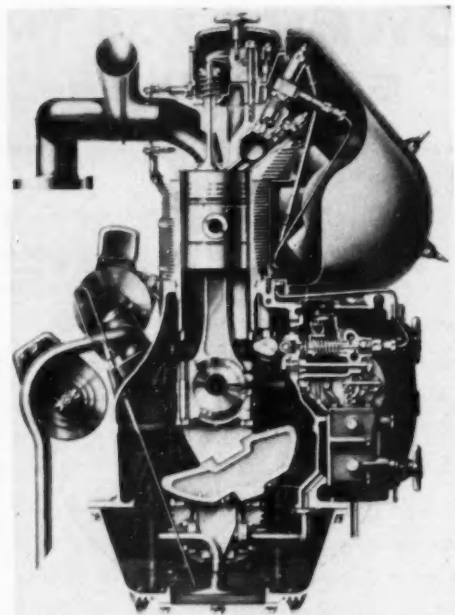


**Including AL-FIN, the Fairchild patented process for the molecular bonding of aluminum and magnesium to steel, cast iron, nickel or titanium.*

Other Divisions: Aircraft Division, Hagerstown, Md. • American Helicopter Division, Manhattan Beach, Calif. • Guided Missiles Division, Wyandanch, N. Y. Kinetics Division, New York, N. Y. • Speed Control Division, St. Augustine, Fla. • Stratos Division, Bay Shore, N. Y.



Transverse section of the V-8 engine showing the valve-operating mechanism, piston design, injection pump, etc.



Transverse section of the in-line, six cylinder engine. A fuel injector, a pear shaped combustion chamber, and arrangement of the bolted-on crankshaft counter weight are among the features shown here.

Technical Details of the Deutz Aircooled Diesel Engines

SHOWN here are sectional views of three of the German-made Deutz aircooled Diesels in a line which includes four- and six-cylinder in-line models and six-, eight- and 12-cylinder, V-type units. All of the engines have the same bore and stroke, $4\frac{3}{4}$ in. by $5\frac{1}{2}$ in., with a compression ratio of 17.8 to 1. Cylinder and head

assemblies are interchangeable among the different engines. With minor adjustments the engines may be adapted to operate on gasoline or they may be purchased equipped for alternate operation on gasoline or Diesel fuel. Diesel Energy Corp., New York City, handles the distribution of Deutz engines in the U. S.

Condensed Specifications of Deutz Diesels

Number of cylinders	4	6 (in line)	V-8	V-12
Maximum torque (lb ft/rpm)	217/1400	325/1400	434/1400	651/1400
Continuous rating (bhp/rpm)	82/2300	120/2250	160/2250	230/1400
Intermittent rating (bhp/rpm)	90/2300	130/2250	175/2250	250/2200
Fuel consumption @ max. torque (lb/bhp-hr)	0.40	0.40	0.40	0.40
No. main bearings	5	7	5	7
Fuel injector	Bosch	Bosch	Bosch	Bosch



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and strip steel . . . for the product
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McLOUTH STEEL CORPORATION
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Manufacturers of Stainless and Carbon Steels

NEW!

the double-duty CP Air Saw

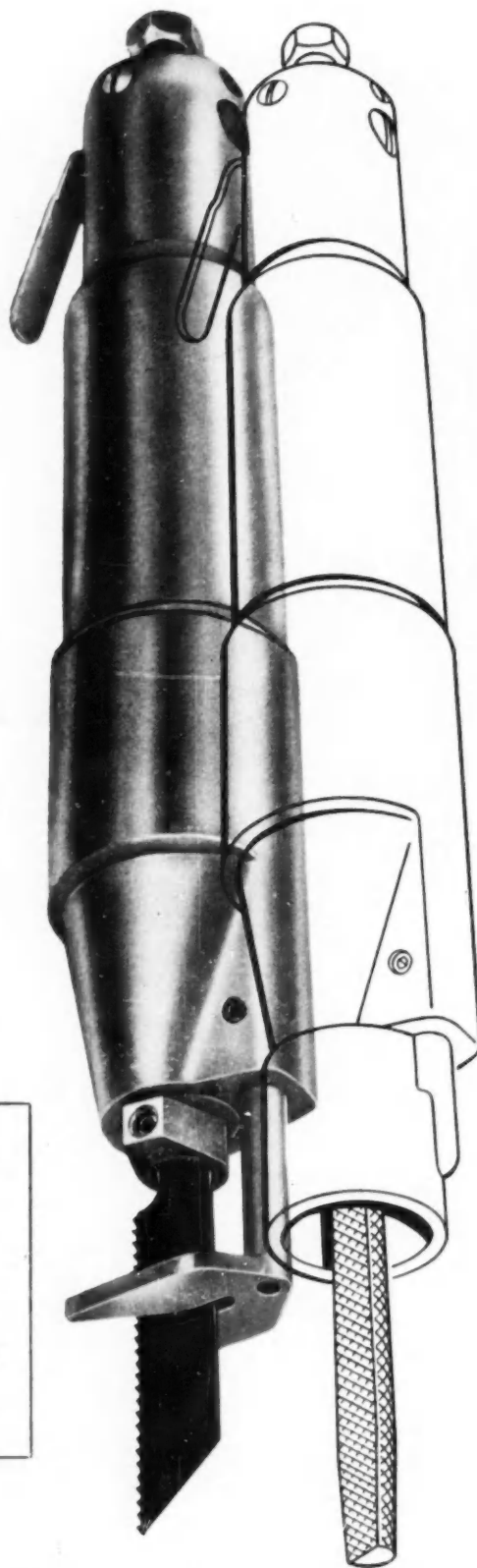
IT CUTS AND FILES . . .

Stainless Steel, Dural Alloys, Nickel, Copper, Aluminum, Iron, Steel, Brass, Plastics, Plexiglass, Fiberglass, Porcelain, Formica, Corrugated Transite Sheeting, Wood, Plywood, Hard Fibre, Wall Board, Masonite.

The CP Air Saw is not an attachment . . . it's a heavy-duty production tool that can take standard blades and files. The Chicago Pneumatic Saw has **CONTROLLABLE POWER** . . . a built-in speed regulator enables you to select the right speed for every specific work condition. When fitted with the blade collet it can saw practically every material and cut most any possible shape . . . a file chuck can be added to power bench files having round or flat shanks. *Chicago Pneumatic Tool Co., 8 East 44th St., New York 17, N. Y.*

EXAMPLES OF ITS THOUSAND-AND-ONE USES

1. **In Receiving and Shipping** — for opening wooden boxes and crates.
2. **In the Shop** — for cutting through thin gauge metal without resulting warpage.
3. **In the Foundry** — for deburring castings.
4. **In the Automotive field** — for installing car heaters, radios and many other "extra" items.
5. **In the Electrical field** — for armature undercutting, cutting coils out of electric motors prior to rewinding, for filing burrs from stator slots in motors and generators.
6. **In Plant Maintenance Departments** — for blind sawing in duct and piping work.




Chicago Pneumatic

PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES • ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES



"SURFINDICATOR—Eliminates arguments on surface finish!"

"ALTHOUGH IT IS DIFFICULT to estimate the savings made possible with gaging equipment," states Sterling Engine Company, "we have realized definite dollar savings with the Brush SURFINDICATOR* just through the elimination of arguments." Sterling uses the SURFINDICATOR to check finish on many precision parts where a microinch finish is specified.

The SURFINDICATOR speeds inspection, saves time, and can help you eliminate costly overfinishing. It can be set up easily for operation by shop personnel. Write for booklet—or ask for a demonstration of the SURFINDICATOR in your plant. Brush representatives are located throughout the United States. In Canada: A. C. Wickman, Ltd., Toronto.

*Trade-Mark

BRUSH ELECTRONICS

INDUSTRIAL AND RESEARCH INSTRUMENTS
PIEZO-ELECTRIC MATERIALS • ACOUSTIC DEVICES
MAGNETIC RECORDING EQUIPMENT
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COMPANY

formerly
The Brush Development Co.
Brush Electronics Company
is an operating unit of
Clevite Corporation.



SMALL PARTS—Chance Vought Aircraft, Inc. checks interior smoothness of fuel valve poppets used in the Cutlass jet fighter with the Brush SURFINDICATOR. Interior surfaces are measured with aid of small-bore pickup.

BRUSH ELECTRONICS COMPANY, Dept. DD -12
3405 Perkins Avenue, Cleveland 14, Ohio

- ☐ Please send free copy of "Surface Finish Control."
☐ Have your nearest representative demonstrate the SURFINDICATOR to me.

Name

Position

Company

Address

City State

WEAN COMBINATION SLITTING AND SHEARING LINE REDUCES PRODUCTION COSTS FOR LYON METAL PRODUCTS

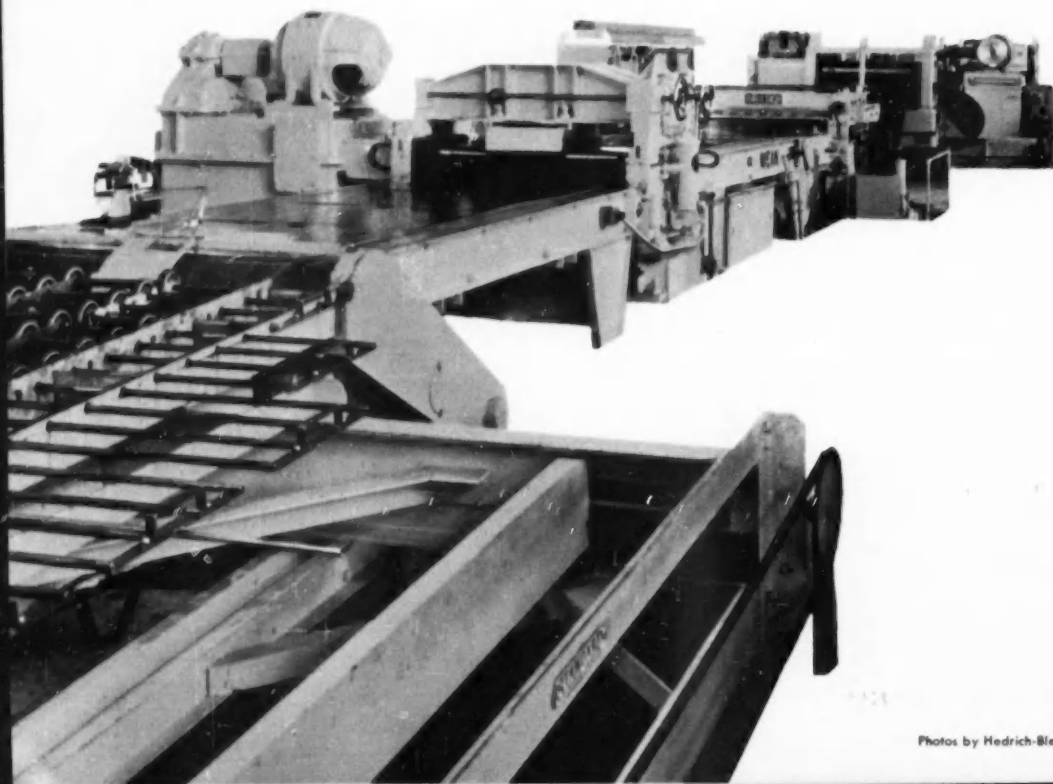


J. B. O'Connor

"We've noted savings made in raw material inventory; greater flexibility of inventory and improved service in our fabricating departments..."

To combat rising costs and meet increasing competition leading manufacturers in every field are giving modern production machinery a thorough going over.

Such was the case at Lyon Metal Products, Aurora, Illinois and York, Pa., one of the nations leading producers of sheet steel products. Months ago Lyon officials began to position themselves for the competition they knew to be inevitable. They reviewed their entire operation — studied every possible means of increasing production while curbing costs.



Photos by Hedrich-Blessing, Chicago

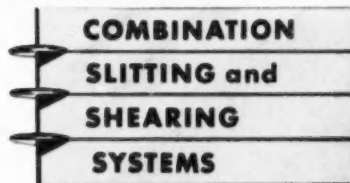
That's where Wean Equipment came into the picture. Wean knew their high production Slitting and Shearing Line was a natural for people like Lyon. They showed Lyon the sizable savings possible by buying coil stock directly from the mill, slitting and shearing to width and length desired. Lyon officials checked other Wean lines at work, cutting to resquared tolerances at 100 cuts or 200 feet-per-minute. Wean Equipment engineers pointed out the fact the users of this equipment required less warehousing, less stock control, that users paid less for their steel, had greater flexibility of their entire operation.

Lyon officials listened, compared figures, checked their costs and gave Wean the green light. Recently J. B. O'Connor, an official of Lyon Metal Products checked over the first three months Wean operation. He made the statement:

"We made a sizable saving in floor space, we accomplished a very much worthwhile reduction in our raw material inventory; we have much greater

flexibility in that raw material inventory and perhaps more important, we are giving all of our fabricating departments a much improved service. We have every reason to believe that this will amortize itself in relation to expected returns on money invested."

If you're in the business of manufacturing products requiring various widths and lengths of steel, like Lyon, it will pay you to talk with Wean Equipment — once you get the entire story we're sure you'll agree the savings possible, even for smaller users, make the Wean Line one of the best investments in modern metal working equipment.

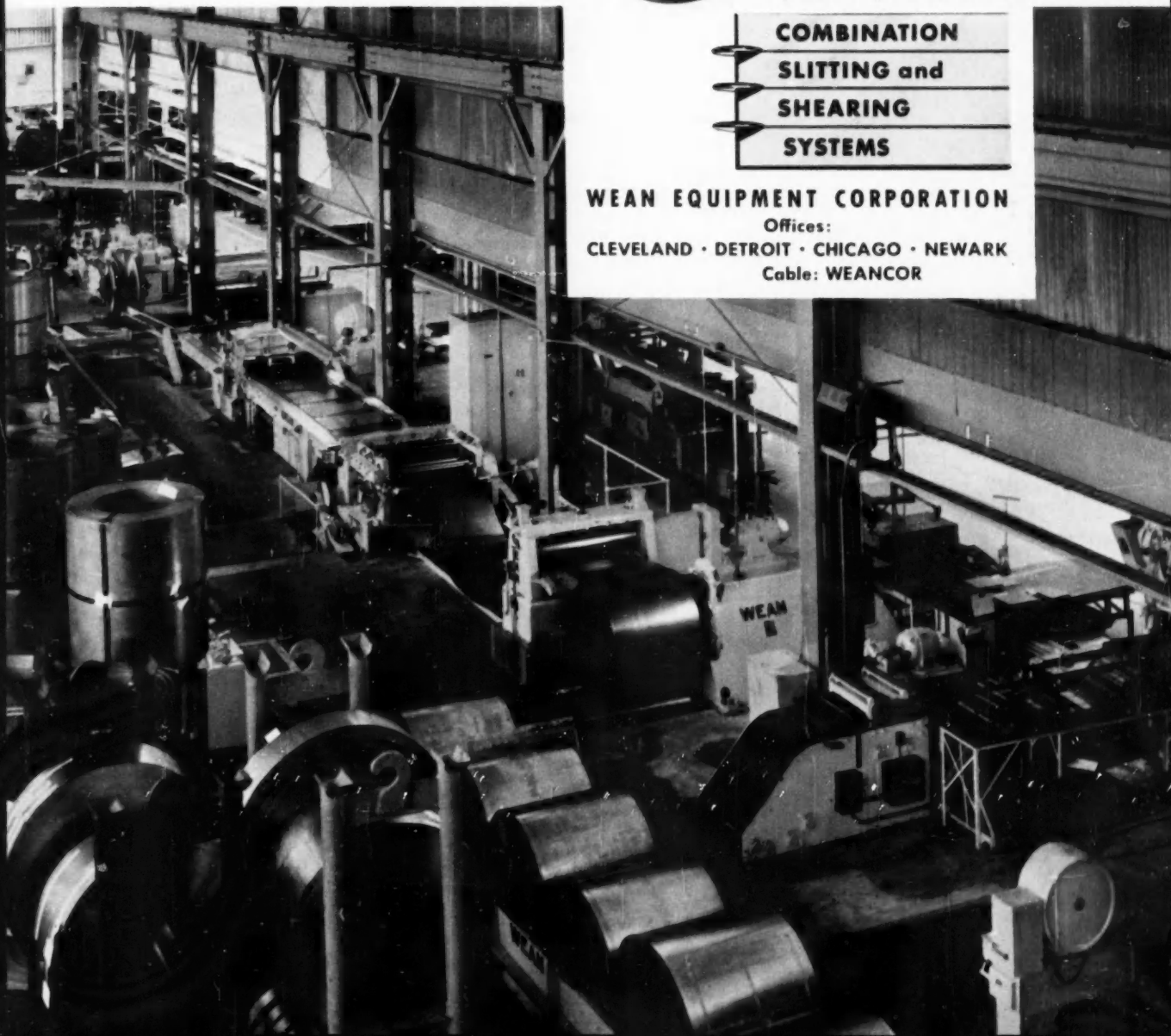


WEAN EQUIPMENT CORPORATION

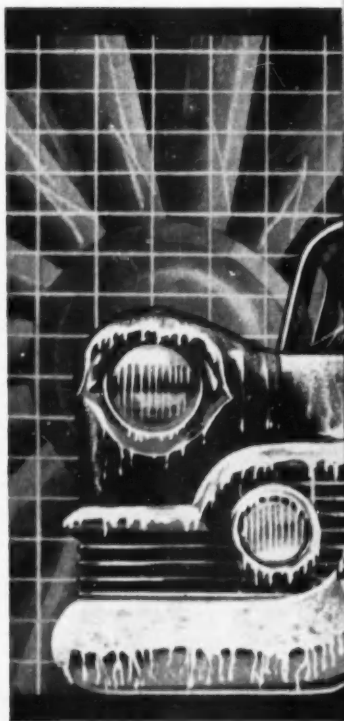
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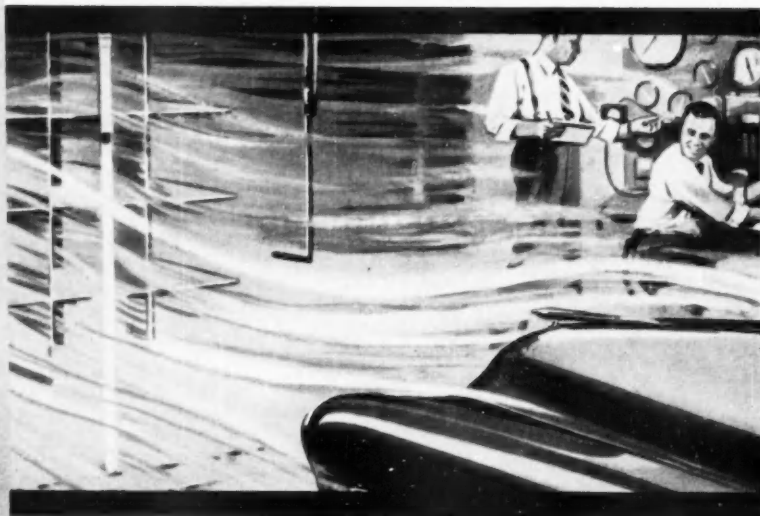
Cable: WEANCOR



**HOT
or
COLD...**



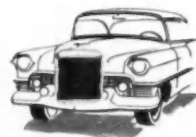
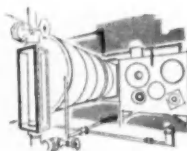
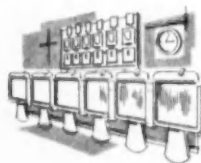
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MADE
TO
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HARRISON HAS THE ANSWER!

Fiery heat or frigid cold—Harrison's in complete control! And we prove it . . . *in advance!* In Harrison automotive research laboratories, wind velocities range up to 100 miles per hour . . . temperatures from a bitter sub-zero to a scorching 100 degrees! Radiators, air conditioning systems, heaters and defrosters—all Harrison products are tested under the most punishing temperature conditions—*hot or cold!* That's why Harrison is a leader in its field—that's why so many manufacturers rely on Harrison exclusively for dependable, economical heat-transfer equipment! If you have a hot or cold problem, look to Harrison for the answer!

HARRISON RADIATOR DIVISION, GENERAL MOTORS CORP., LOCKPORT, N. Y.



HARRISON



Wheels by Kelsey-Hayes for Today's More Powerful Cars

Everything in the modern car of today, from higher horsepower under hood to power brakes and steering, imposes extra burden on the wheels. Engineering and building wheels to withstand the ever-increasing burdens of added power and vehicle weight has been the business of Kelsey-Hayes since the birth of the motorized vehicle itself.

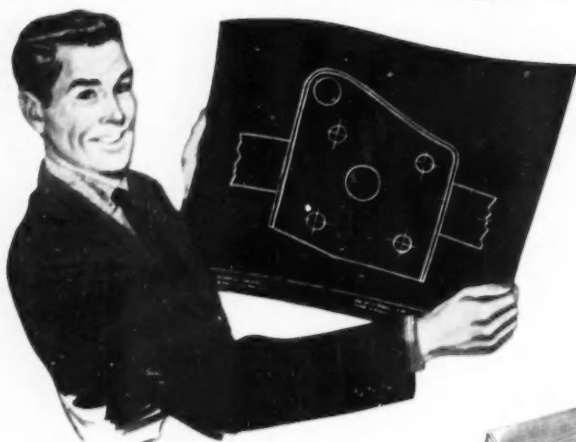
Because of their proven performance and dependability through the years, more cars roll on wheels by Kelsey-Hayes today than any other kind. Kelsey-Hayes Wheel Company, Detroit 32, Michigan.

KELSEY HAYES

World's Largest Producer of Automotive Wheels

Wheels, Brakes, Hubs, Brake Drums, Special Parts for all Industry • 9 Plants — Detroit and Jackson, Mich. . . . McKeesport, Pa. . . . Los Angeles . . . Windsor, Ont., Canada . . . Davenport, Ia. (French & Hecht Farm Implement and Wheel Div.)

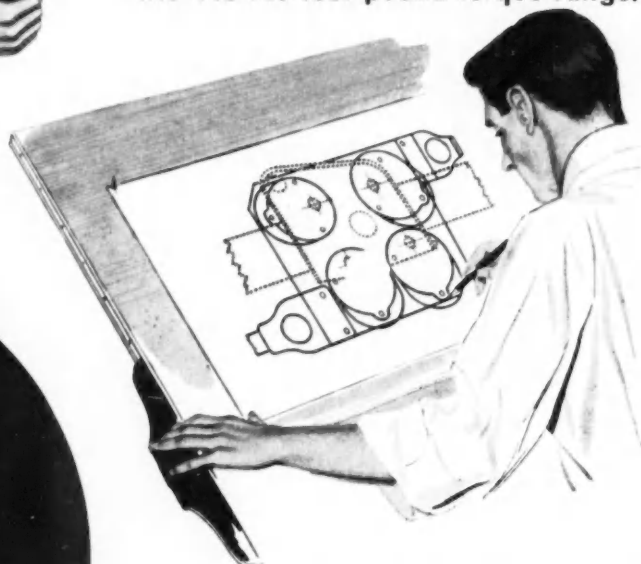
Keller Multiple Nut Setters



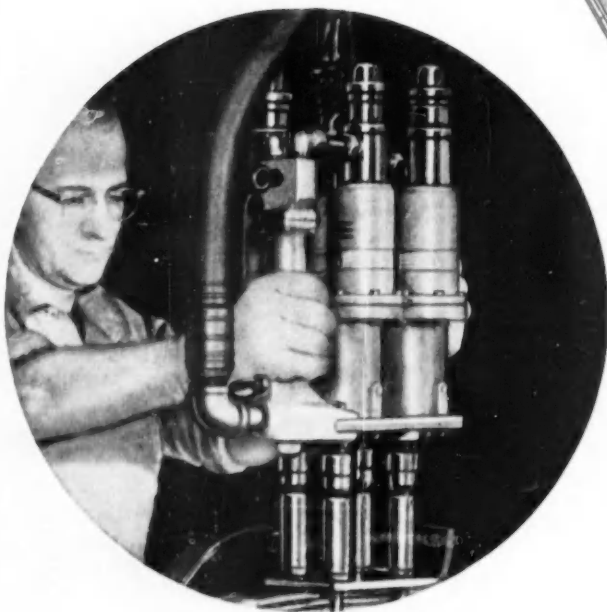
From the bolt pattern on your own blueprint

achieve
ACCURATE TORQUE CONTROL
and FAST RUN-DOWN

on multiple nut setting operations in the 4 to 140 foot-pound torque range.



... a tool design that meets your needs



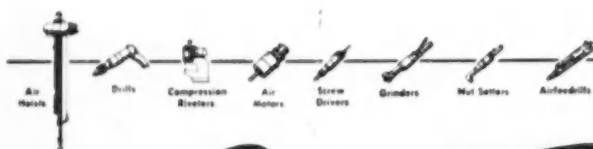
... and a complete Multiple Nut Setter built up with standard unit assemblies

Do you have a nut setting problem involving a reduction in time or the maintenance of accurate torque control in setting two or more nuts? Then let our field engineer show you how Keller Multiple Nut Setters can solve this type of problem.

On your own blueprint of the job, he will lay out the complete tool—showing size and location of motor units and handles, and an outline of the mounting plate.

From this layout, Keller builds up the complete Multiple Nut Setter from standard units (only the mounting plate is special). You have a tool engineered to your specific job—with economies gained from standard unit construction.

For catalog information, ask for Bulletin No. 12.



KELLER *Pneumatic Tools*



KELLER TOOL COMPANY
1317 Fulton Street
Grand Haven, Michigan

Car Market in Venezuela

(Continued from page 102)

cent are locally assembled. The plant is capable of turning out any of 33 different truck models, as well as all three series of Plymouth, Dodge and De Soto four-door sedans. For reasons similar to those of General Motors, Ensamblaje does not produce two-door sedans, coups, convertibles, or the big Chrysler.

Local tastes and demands have a considerable effect on the assembly of cars here. No two-door cars are produced, due to the overwhelming popularity of the four-door models, prized for their resale value as taxis. Leather or imitation leather upholstery is a must on locally-assembled passenger cars; as the U. S.-preferred standard cloth upholstery is not popular with the Venezuelan driver. Local road conditions, dusty summer weather, and the local gasoline result in other modifications of the automobiles from the U. S. standard model. Some of the changes are (1) a larger radiator, (2) a larger air cleaner, (3) heavy duty shock absorbers, (4) in many cases, heavy duty springs, (5) different compression cylinder heads, (6) different gear and rear axle ratios. In addition, the standard gear shift is relatively more popular here than in the States, especially in some of the mountainous country to the southwest.

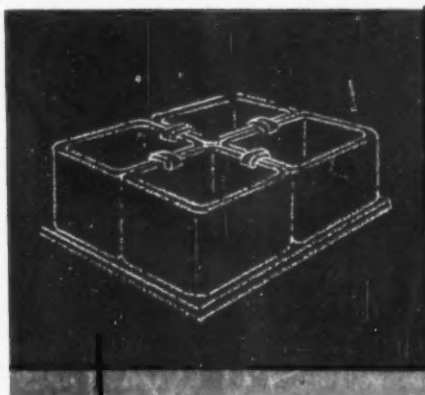
The Venezuelan government, eager to spur the industrial development of the country, has established a differential in duty as between assembled and CKD (completely knocked-down) cars, of sufficient amount to attract the establishment of assembly plants here. The government foregoes a revenue of approximately \$350.00 for each unassembled car that is imported.

Machining Huge Dies

(Continued from page 53)

floating to a heavy support pedestal anchored on a concrete block in the floor. Suspension of the intermediate and jig frames, with respect to the support pedestal, is reminiscent of the pantograph suspension design.

Special anti-friction bearings used for the hinges, plus the lightweight aluminum box-type construction permits swinging of the jig filing head with negligible effort. The swing of this head gives complete coverage throughout a working area 30 in. in diameter.



HOLCROFT and the BATCH FURNACE

More Jobs . . .

Faster . . . at a Lower Cost

The batch furnace permits you to handle a large variety of jobs—it can be completely automated for faster production—and can deliver volume production at a low, low cost.

For example, in the furnace shown below you can anneal, temper, clean harden, carbon restore, carburize or carbonitride entirely automatically.

In a batch furnace, the entire work load is positioned inside the chamber and is removed after the heat treat cycle has been completed. Batch furnace may have several stock handling methods: tray, car, cover, elevator, pit, and tumbling barrel depending on the type of stock treated.

Just as great a variety of stock handling methods pop up when furnaces are continuous, that is where successive loads parade through heat treat cycle. You will find a complete description of all types of continuous furnaces and their methods of handling stock in Holcroft's book—Blazing the Heat Treat Trail. You can have a copy if you write today. Holcroft & Company, 6545 Epworth Blvd., Detroit 10, Mich.

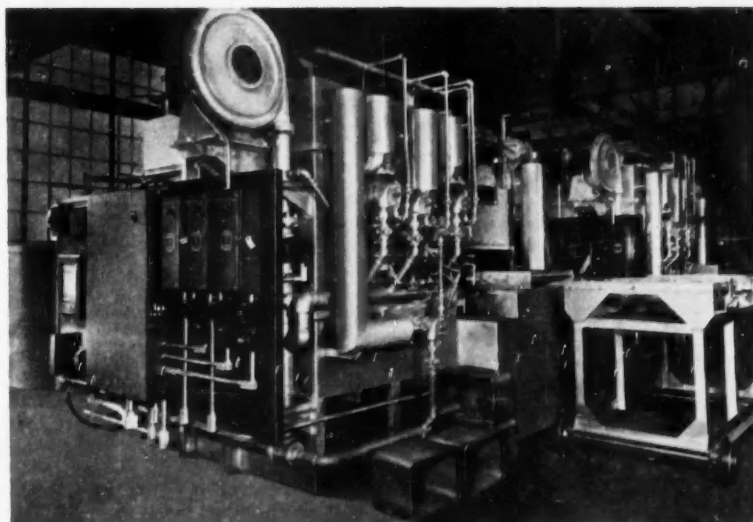


PRODUCTION HEAT TREAT FURNACES FOR EVERY PURPOSE

CHICAGO, ILL. CLEVELAND, OHIO HOUSTON, TEXAS PHILADELPHIA, PA.

CANADA Walker Metal Products, Ltd., Windsor, Ontario

EUROPE S.O.F.I.M. Paris 8, France



Current Engine Problems Discussed at SAE Meetings

(Continued from page 58)

vidual manifolds were 3¼-in. inside diameter, a size requested by two turbocharger manufacturers. The manifolds were necessarily rather long, averaging nearly ten ft. The air-box temperature for all tests was maintained at 100 F.

The dashed lines on Fig. 3 are the results of those tests. Combustion was very poor, being 14 per cent above the

predicted fuel consumption at the original rating of 1600 bhp, 750 rpm. It climbed rapidly to 0.484 lb per bhp-hr at 1800 bhp, as compared to the predicted 0.396. Exhaust temperature was correspondingly high and maximum cylinder pressure low. The compression ratio could have been restored safely to its original 15.6:1. Part of the reason for the

poor combustion obviously was the deficiency in air flow, which was five to seven per cent less than expected. The turbocharger compressor discharge pressure was about one psi low, but that was partly compensated for by the decreased pressure drop through the new system. Approximate calculations showed that the overall efficiency of this first turbocharger, at these low air flows, was only 56 per cent as compared to the expected 62 per cent.

The only tenable theory presented was that the ports opened at a time when scavenging flow was too easy and there was a rapid flow through the cylinder. Because of the velocity of the air, there was very incomplete scavenging and air was wasted in straight-through flow rather than in flushing. After that period, the differential was not sufficiently great. Consequently, air flow was nearly normal, but the cylinder charge was vitiated with exhaust gas. There was no indication of the pressure wave resurging back into the cylinder.

For a quick comparison, the divided manifolds were replaced with the simplest of common manifolds. All sixteen cylinders opened into a common header which flared out to a width that permitted attachment to the two turbochargers in parallel. The manifold end was a simple flat plate with no provision for reducing turbulence or assisting air flow. Figure 3 shows the results with that manifold, also. Turbine efficiency was reduced appreciably, as much as 21 per cent. Consequently air flow was reduced by five to 10 per cent. Despite the reduced air flow, 2000 bhp was carried with a fuel consumption less than that at 1500 bhp with the divided manifolds. Pressure differential across the cylinder was cut in half. Because of the low air flow, combustion was still unsatisfactory and the exhaust temperature remained high, despite the marked improvement.

The next step will be to change to a manifolding which should retain more of the pulse energy of the exhaust, to maintain turbocharger efficiency, while decreasing or preventing the detrimental backpressure effect on the engine.

Specialized Service IN AUTOMOTIVE PROTECTION AND SAFETY

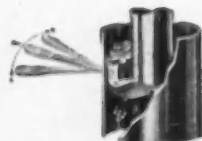
United Specialties Company produces a variety of steel-processed products for the automotive and other industries that contribute materially to improved performance, economy and satisfaction.



Combination Oil Bath Air Cleaner and Silencer for use on down-draft carburetors.



Plastic pre-cleaner is easily attached — has a transparent dust chamber — reduces air cleaner servicing frequency — saves oil — fits practically any center tube air cleaner.



Concealed type, six-wire turn signal switch. Uses regular front and rear park or stop lights. Signal is self-cancelling.



Conventional type ignition switch used on popular makes of cars and trucks.

UNITED AIR CLEANER DIVISION

Oil Bath Air Cleaners — United manufactures a complete line of oil bath air cleaners for protection of engines in trucks, busses, tractors, cars, stationary or portable power units — a range of models to fit every type of internal combustion engine including diesels. United has designed and built almost 20 million air cleaner units.

Our sales engineers will give prompt attention to your inquiries.

MITCHELL DIVISION

Semi-Automatic, Self-Cancelling Turn Signal Switch built by Mitchell is standard equipment on many cars and trucks.

Mitchell Ignition Switch has an industry-wide reputation for dependability and extra long life. "Radio" position reduces battery drain with motor off.

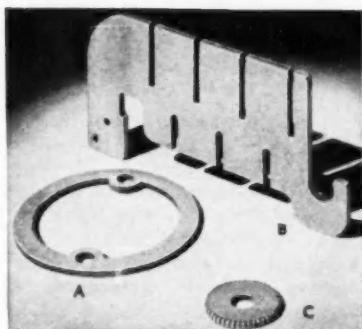
Rolled Shapes, stampings and dovetails are offered by Mitchell in a complete range of metals, gauges and designs.

UNITED SPECIALTIES COMPANY

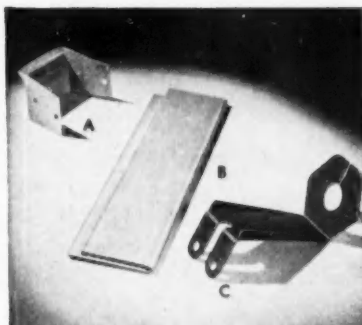
UNITED AIR CLEANER DIVISION — CHICAGO 28

MITCHELL DIVISION — PHILADELPHIA 36 • BIRMINGHAM 11, ALABAMA

**AUTOMOTIVE INDUSTRIES
Keeps You Informed**



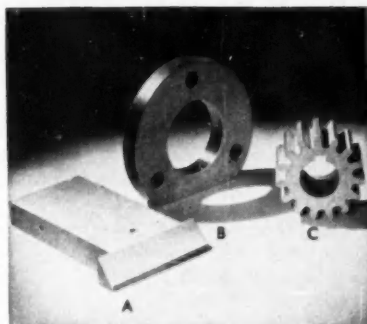
A. Sheet stock, shear strips, punch. B. Sheet stock, shear, punch blank, gang saw notches. C. Sheet stock, shear strips, punch blank, mill notches.



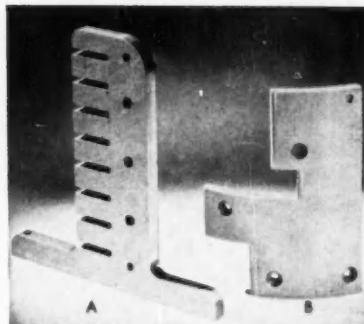
A. Sheet stock, shear strips, punch, form. B. Sheet stock, shear to size, drill, form. C. Sheet stock, shear strips, punch pieces, form in mold twice, rubber stamp twice.



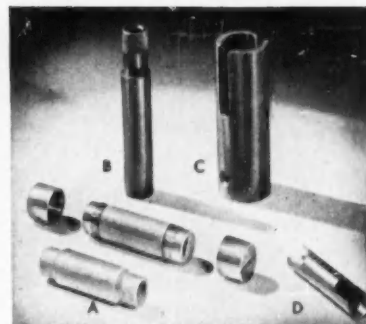
A. Rod (hexagonal), smooth saw, automatic screw machine, turn shoulder thread, chamfer and cut off. Remainder are automatic screw machine parts made from Diamond Fibre by C-D-F.



A. Sheet stock, sand, smooth saw to size, smooth saw bevel, smooth saw corner cut out, drill. B. Sheet stock, hand saw, turn OD, bore ID, smooth saw side, drill five blind holes with jig. C. Sheet stock, sand, hand saw, rough bore ID, hob teeth, finish bore ID, machine keyway.



A. Sheet stock, sand, smooth saw, drill, smooth saw to shape, radius three corners, gang saw notches. B. Sheet stock, hand saw rough blanks, form, smooth saw width, length and shape, radius edges, drill with jig, countersink.



A. Tube, automatic screw machine, turn shoulders, chamfer and thread end, thread other. B. Tube (long pieces), smooth saw, tap threads, screw machine, (small pieces) auto, screw machine, thread, knurl, chamfer, cut off. C. Tube, smooth saw to length, punch twice, countersink. D. Tube, automatic screw machine, chamfer, cut off, punch.

C-D-F fabricates and forms DIAMOND VULCANIZED FIBRE

FAST . . . AT LOW COST . . . DEPENDABLY

Vulcanized Fibre is a wonderful material if you know where to use it and how to buy it. We suggest on many jobs that it's best to do the fabrication and forming in C-D-F's shops. Why? Because C-D-F knows how. Since 1895 the company has put fibre to work in everything from buggy axle bushings to metal clad radio parts. The handling of thousands of set-ups for high speed, low cost production runs gives C-D-F an "experience bank" to draw from. Shop supervisors have a wealth of short cuts, little tricks that result in lower prices for you. They know the material and its peculiarities.

TOUGH, RESILIENT, STRONG

How long has it been since you examined the unique properties and wide range of C-D-F fibre grades? Vulcanized Fibre is arc resistant, mechanic-

ally strong, non-corroding, half the weight of aluminum. Repeated moistening and drying in forming insignificantly alters the nature, structure or quality of the fibre.

Since C-D-F has their own paper mill, uniform, quality control is made possible. Special grades are more easily developed. A good example is C-D-F Abrasive Fibre, a medium density fibre with excellent resin and grit adhesion, now widely used for abrasive discs.

A BIG, RELIABLE SOURCE

C-D-F does business with the largest

tonnage users of sheet, rod and tube fibre in the world. This means good deliveries, good prices, reliable products for every new customer. You deal with a materials engineer, a C-D-F man who knows how to give you the most value in Diamond Vulcanized Fibre. If you want to improve design, simplify purchasing, speed production, use Diamond Fibre and the facilities of C-D-F. Write for catalog, free test samples, or send us your print for quotation.



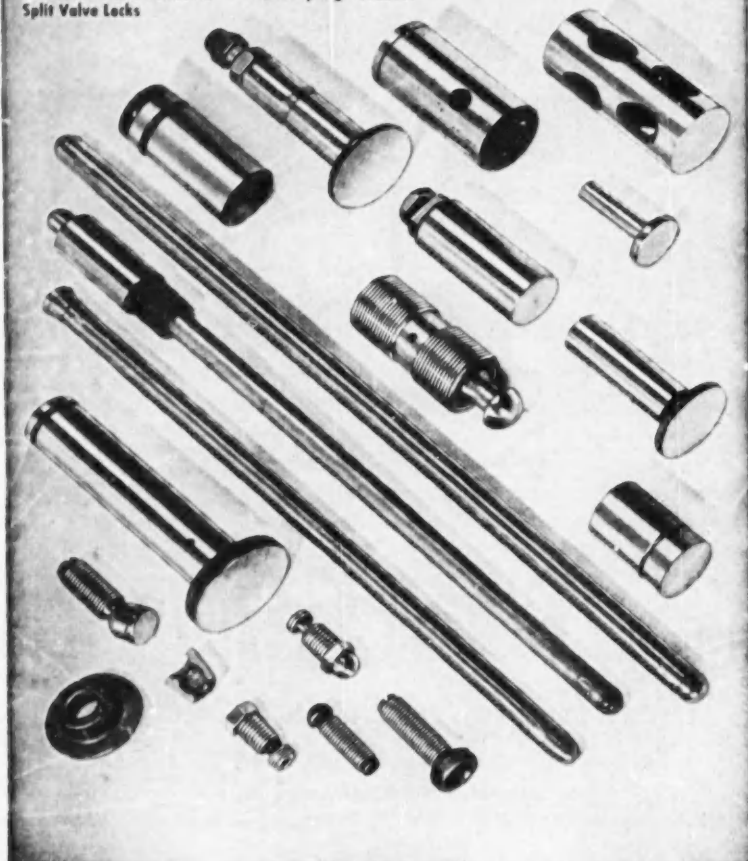
Continental-Diamond Fibre

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NEWARK 2, DELAWARE

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Special Screw Machine Parts $\frac{1}{16}$ " to 5" Diameter
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• Socket Screw Products

**The CHICAGO
SCREW COMPANY**

2801 WASHINGTON BLVD.
BELLWOOD, ILLINOIS
Established 1872

Station Wagon Popularity

(Continued from page 100)

turer notes that its biggest customers are families who have found the station wagon practical as a first car. Large families appreciate the extra space for passengers and cargo. In many instances, the station wagon is gaining at the expense of the four-door sedan.

Although sales and registration figures last year indicated that the station wagon was most popular on the Western and Eastern seaboard, its popularity is beginning to equalize in all parts of the country.

Aware of the upward trend in this type of vehicle, car and truck makers this year are offering more than 40 different models. Factory delivery prices (including Federal taxes) range from \$1,800 for the Nash two-door Suburban to Chrysler's Town and Country, which has a factory delivery tag of \$3,989. At least one maker expects to double production of the vehicle in 1955 and plans to add another model to its line. Chevrolet reportedly is readying its Nomad station wagon for 1955, and others also may add models.

In the next 10 years, industry officials believe, station wagons will be as common as the popular passenger body styles which make up the biggest share of the market today. It will not be unusual, they say, for this type of body to reach 20 per cent of total production in the industry. At present, station wagons represent a little more than five per cent of total industry output.

The modern consumer considers price, needless to say, but he balances that price against what he gets for his money. Increasing numbers of buyers undoubtedly believe they are getting their money's worth from the station wagon.

BOOKS...

CORPORATE STRUCTURE OF THE CORPORATION, published by American Institute of Management, 125 East 38th St., New York 16, N. Y. Price, \$12.00. The structure of management is thoroughly treated in this new book. A 109-page monograph, it poses 28 questions, the answers to which will readily demonstrate to the self-analyzing management where its own structural weaknesses lie.

Du Pont announces . . . **NEW TYPE** lube oil additives



Starting with new engines, a representative number of taxicabs were tested in 50,000 miles of low-duty service (with oil-drain periods at 4500 to 5000 miles) to determine the effectiveness of Du Pont Lube Oil Additive 564. Typical results are indicated by the two sets of photographs above.

Notice the difference in sludge on the oil screen and timing gear cover on the left as compared to the clean appearance of the corresponding parts at the right. Those on the left were operated on a representative heavy-duty motor oil (for service MS and DG). The cleanliness of those on the right resulted from the use of the same base oil to which only Du Pont Lube Oil Additive 564 plus an antioxidant had been added.

...polymeric additives offer solution to your low-duty sludge problems

A new solution to engine oil sludge problems, particularly those caused by low-power, low-temperature, and other low-duty driving conditions is now possible. This is especially significant to the mass passenger car market, and is also of interest to the operators of urban fleets—taxis, buses and delivery services.

The solution of sludge problems is available through the use of new polymeric lube oil additives by Du Pont. Being outstanding detergents and viscosity-index improvers, these double-action additives are exceptionally economical and effective under stop-and-go driving conditions. They are especially effective in retarding sludge formation on all engine parts in contact with lubricating oil. As a result, Du Pont Polymeric Lube Oil Additives help maintain good engine lubri-

cation and extend the useful life of your customers' engines.

Leave No Deposit

Polymeric lube oil additives, being ashless detergents, permit more efficient operation of the engine oil system. Oil screens and filters are kept clean and free from sludge. The resulting free flow of oil through the engine keeps it in better operating condition.

Cost Less Than Other Detergents

Du Pont Polymeric Lube Oil Additives are effective in low concentrations. And, when used in multi-graded oils, result in substantial savings since these new additives are both detergents and V.I. improvers. They are supplied in two molecular weights—Lube Oil Additive 564 (formerly PL-164A) and Lube Oil Additive

565 (formerly PL-164). Commercial quantities of both additives are now available.

Helping refiners to keep fuels and lubricants in step with developments in engine design through the use of additives is a continuing project of the Du Pont Petroleum Laboratory. Du Pont Polymeric Lube Oil Additives are among the latest results of efforts along these lines.



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Developments in Production—without Chips

(Continued from page 65)

the cold rolling process as used to produce sheet stock. The same technique can now be used to produce finished parts with varying geometry. The forces of rolling metal are shown by the diagram in Fig. 2.

Using the principles of rolling metal, numerous parts can now be produced without the added requirement of finishing. Using forces of

approximately 200,000 to 300,000 psi, it is possible to cold form metal without fracturing. Figure 3 shows the use of sheet material as the stock to produce a cone with reduced wall thickness. By the use of a die or mandrel, it is possible to control the contour accurately and to produce a product without welding and finishing. Figure 4 shows other such com-

binations. By the use of developed blanks, tapered wall cones can be produced. Figure 5 shows a die stamped blank roll formed to a finished part without machining or welding.

The principle of rolling metal against a mandrel can also be applied to cylindrical parts (see Fig. 6). The blank can be formed from a cup, tubing, rolled up and welded rings, or cast rings. The roll is again applied in such a manner that it has the features of a cold rolling strip mill on a much smaller scale. Irregular shapes can be produced by using shaped mandrels, contoured rolls, or a combination of both. If internal irregularities are required, the mandrel may be segmented for removal after forming. If the external shape is such that it can be traced, contouring attachments similar to those used to control the tracing of a tool on a duplicating lathe or milling machine can be used to control the roll.

It may be desirable to make a product that requires changing cross sections but basically is flat. The principle used in producing sheet metal can be used. The tableware industry has developed this process to a high degree of perfection. Knives and spoons are rolled to give the required varying thickness. During World War II, the German tableware industry was brought into the military production program to produce compressor blades for aircraft gas turbines. The blades were produced with excellent surface finish and material utilization. Leading American jet aircraft engines are now using blades produced by the cold rolling process. Figure 7 shows such a blade.

As the concept of using compressive forces to make heavy reductions in metal became more fully comprehended, it was found that more drastic reductions of metal can be made without fracture and still produce the desired surface finish and accuracy of cold rolled sheet stock. An example of such is shown by the activity of the German aircraft industry to produce the cooling fins on the cylinder barrel by roll forming instead of machining as has been the practice in this country. This principle can be adopted in the production of parts both to reduce the cost and to conserve material.

Presently, American industry is developing other techniques of producing such complex shapes as gear teeth and splines by cold forming. Various

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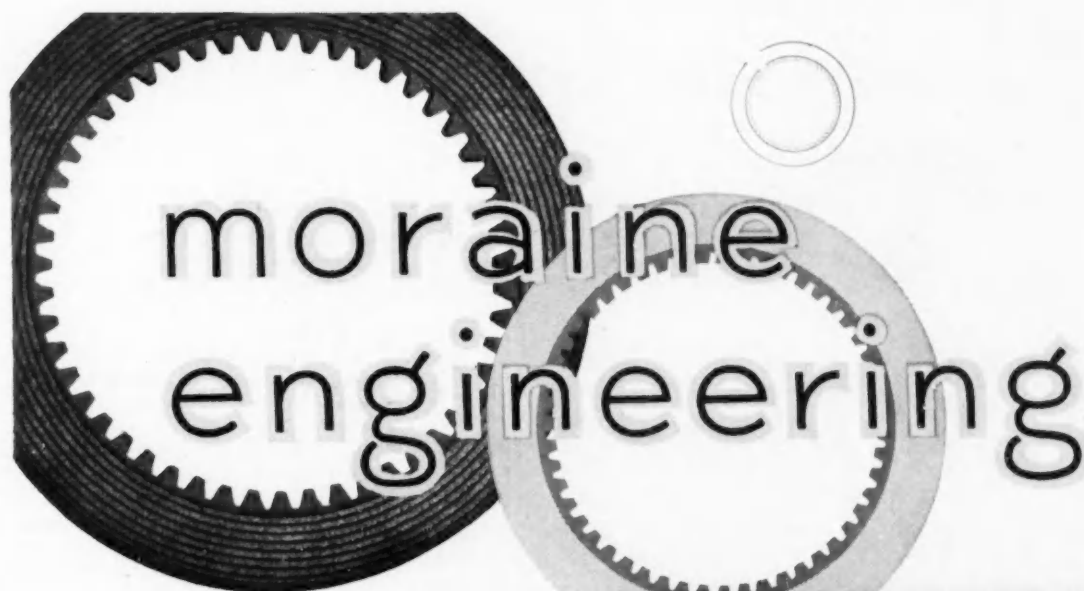
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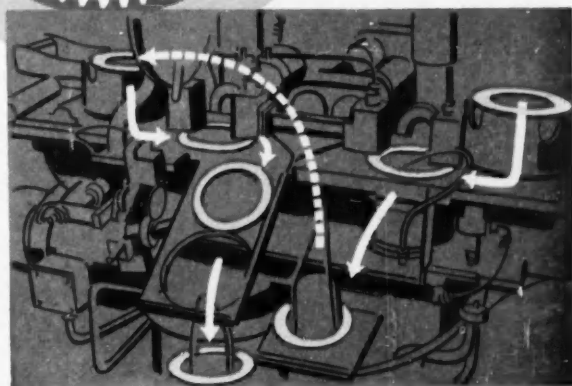
...planning that pays off

Better products at lower cost are usually the result of improved design *plus* improved processing. Take, for example, the clutch plates Moraine makes for automatic transmissions used in automotive vehicles. In the beginning each plate required many separate individual operations. Now these plates are fed into a specially designed automatic machine and completely processed with a great saving in labor costs. This specific example of the "forward thinking" at Moraine benefits both you *and* your customer.



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methods are being used but the ultimate result in each process is to produce a spline or gear tooth to size without machining, and with a good finish, and with an improvement in blank hardness.

It has become common practice to produce most of the fasteners in this country by cold forming methods. The stock used generally is round bar or rod and is cold headed and the threads rolled to produce the most accurate and strongest product at the lowest cost. The cost differential and material saving for cold formed bolts and screws serve as guideposts for further efforts in the metalworking industry. Bolts of even the most difficult to work materials are now being formed to size without subsequent finishing.

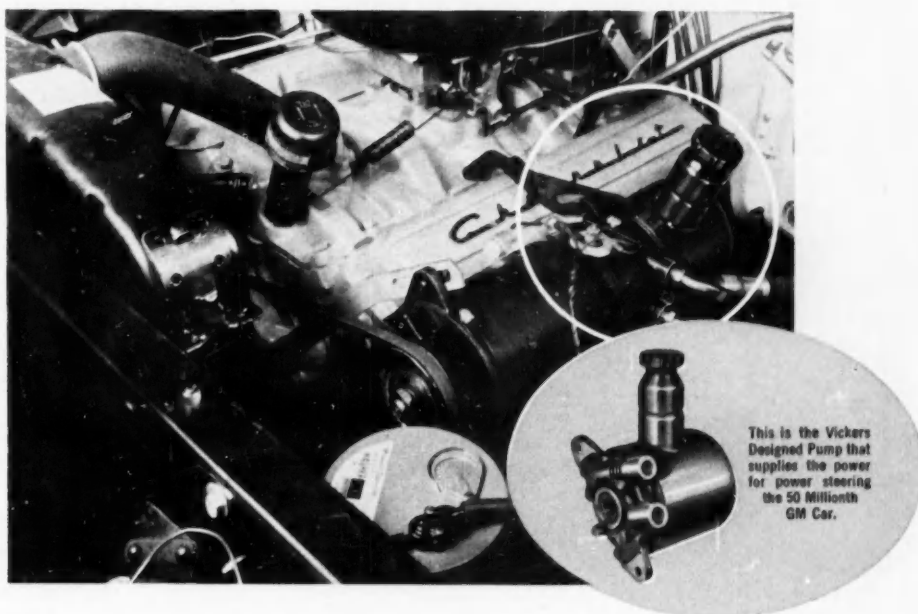
The American machine tool industry has begun to recognize the potential of the cold forming processes and is now introducing new lines of equipment that will produce irregular shapes without machining. When equipment is more readily available, it is expected that industry will make parts with a minimum of machining for a maximum material utilization and still produce them at a minimum of cost.

American industry is rapidly accepting manufacturing processes for producing parts rather than for making chips. It also finds that in many products it will get an added bonus of a stronger part with better surface finish and with only a small reduction in elongation by the method of plastic deformation. The concept of reducing cost and improving quality by chipless production is becoming a reality because chips are our most expensive product.

BOOKS...

THE LIGHT METALS HANDBOOK, published by D. Van Nostrand Co., Inc., 250 Fourth Ave., New York, N. Y. Price, \$8.50. This book simplifies the task of gathering facts and information on aluminum- and magnesium-base alloys. It was written to serve all aircraft, industrial, and civil engineers, fabricators and light metal foundries, as well as men developing engineering specifications. Concise, yet complete, analysis of aluminum and magnesium alloys is presented from which correct selection can be made by comparison of alloying stabilities and chemical reaction characteristics, and by following through the procurement stages to actual testing. Included for various classes of alloy materials are data on mechanical properties at room, low, and elevated temperatures; on physical properties, on choice of alloy, casting, formability, heat treatment, corrosion, machinability, on joining methods and detailed properties of individual compositions.

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Remote Indication of Turbine Blade Temperature

(Continued from page 71)

of a number of pairs of input and output coils on the rotating shaft, with one stationary set of energizing and information-receiving coils mounted on the turbine frame. Rotation of the shaft brings each coil pair into and out of coupling with the stationary

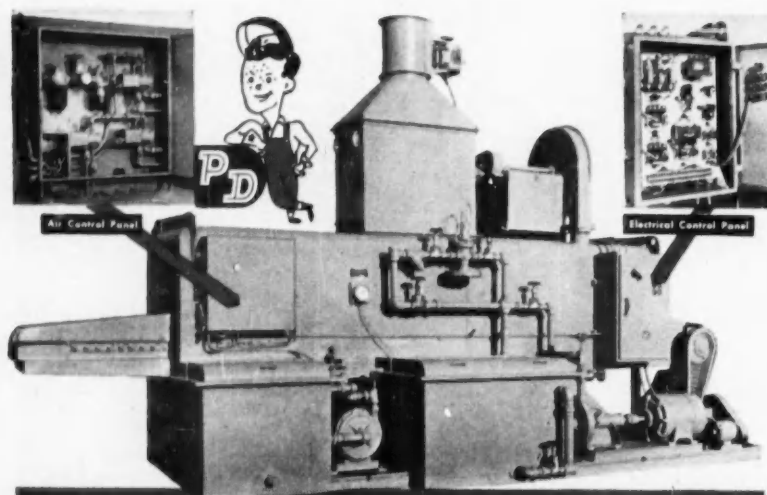
coils. Each channel or set of rotating coils is sampled periodically with rotation; thus signal information is sequential in nature. This development offers several useful advantages. Since the inductive commutator is a non-contacting device, there is no

wear problem. Large vibration amplitudes have virtually no effect upon the transfer properties. The presence of oil or water vapor also has no appreciable effect upon the signal transfer because the coupling is inductive between low-impedance windings. Moreover, the shaft may be run in either direction without modification of the unit.

The electrical circuit of the inductive coupling units is simple. One stationary coil is excited with current at a low radio frequency; the other stationary coil serves as the source of output voltage. On the rotating structure, the coil pairs are electrically connected together and shunted by the variable-resistance thermometer element. One of the rotating pair couples electromagnetically with the exciting stationary coil, the other with the output coil. The result is that the amount of energy transferred through the device is governed by the resistance of the thermometer element when its particular rotating coil pair is coupled to the stationary coils. With optimum design, the carrier-frequency voltage output is very nearly a linear function of thermometer resistance. The magnitude of the output is independent of the speed of rotation.

In order to remove the dependence of the magnitude of the output voltage on the strength of excitation of the input coil, one of the channels is used for calibration, and a fixed, known resistance is substituted for one of the temperature-sensitive elements. Thus the ratio of the output of any of the signal channels to that of the calibration channel is the true measure of the resistance of the sensing element. This ratio is easily determined by adjusting the excitation for a constant output from the calibration channel, whereupon the signal channel output may then be read directly. The gain-determining features obtained through the use of the calibration channel also provide a means of compensation for changes in the oscillator frequency and for changes of resistance in the commutator windings.

In the NBS instrumentation system, five rotating coil pairs provide a four-channel measurement system; the fifth channel is reserved for calibration. Surrounding the commutator coils are five synchronizing coils which allow the selection of any one channel for observation. The selection is accomplished by gating on the source of r-f excitation when the chosen rotating pair comes between the fixed coils. Gating is achieved by mounting a short piece of high-permeability ma-



AUTOMATION in Washing Equipment by P-D

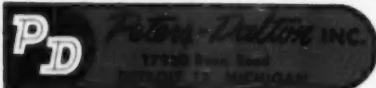
(Above photograph is of a 3-Stage Washer for Torque Converter Housings)

Many important production problems are met and solved by this Power Spray Washer—designed, engineered, and built by Peters-Dalton. It meets the full meaning of the newly coined word "automation" by eliminating many processes that were formerly manual or handled through separate facilities.

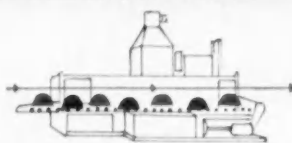
Extremely efficient, time-saving, and economical in operation is the action of this 3-Stage Washer. It sprays both the inside and outside of converter housings. The operation is done in a continuous action—first, the housings are fed to the machine on gravity rolls—then an air cylinder moves each over the inside spray manifold. This same motion holds back the unit following and moves the preceding unit onto a cross-rod conveyor for outside wash. Another cylinder positions each unit over the manifold and blocks the shaft opening. The inside and outside wash are both heated emulsified oil cleaners—room air blow-off removes excess oil. The exhaust has an eliminator and a filter box for entrapping overspray.

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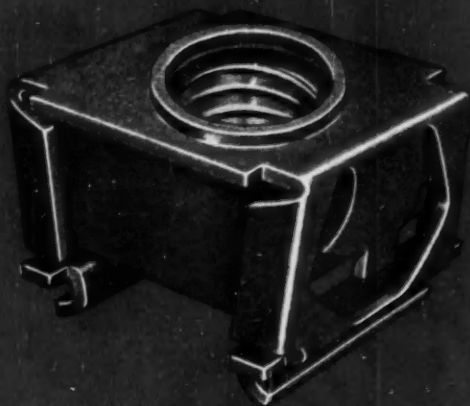
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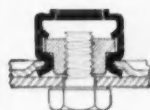
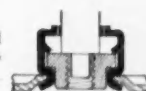
Whatever your present method of attaching square nuts to panels, new self-anchoring **SPEED GRIPS** can do the job faster, easier, better. This unique fastener has spring steel "mechanical hands" that permanently lock the nut in bolt-receiving position. It cannot be dislodged even with rough handling. Applied after painting or porcelainizing, there is no clogging, retapping or masking of threads to bother about. *And* it is ideal for blind location attachments.

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Simple tool presses nut into locked position.



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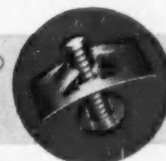
Write today for free copy of new detailed **SPEED GRIP** Bulletin, No. 335. Tinnerman Products, Inc., Dept. 12, Box 6688, Cleveland 1, Ohio. *In Canada:* Dominion Fasteners Ltd., Hamilton, Ontario. *In Great Britain:* Simmonds Aerocessories, Ltd., Treforest, Wales. *In France:* Aerocessoires Simmonds, S.A., 7 rue Henri Barbusse, Levallois (Seine).



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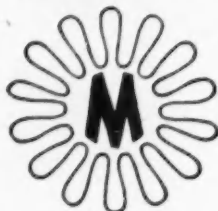
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terial around the outside of the rotating disk so that it is centered under a synchronizing coil whenever the signal coil pair is at maximum coupling. Therefore the inductance of anyone synchronizing coil is raised for a part of each shaft revolution, and during this time the excitation oscillator is gated on. Thus the desired channel may be selected by switching the appropriate synchronizing coil into the synchronizing circuit. This method of channel selection is independent of the speed and of the direction of rotation.

The electronic circuit portion of the system provides the necessary radio-frequency excitation and output interpretation for the inductive commutator. Essential elements include the synchronizing pulse generator, gated excitation oscillator, output signal amplifier, and peak voltage detector. Six tubes and a power supply are utilized in the instrument. In order to permit remote location of the electronic unit away from the engine testing pit, it is connected to the commutator through 50-ft cables.

The resistance elements are calibrated in an oven at a known temperature. The turbine shaft need not be rotating since an internal 60-cycle synchronizing pulse permits readings with the commutator rotor stationary. It is only necessary that the gain controls be adjusted for the reference value on the calibration channel and for the known oven temperature as indicated on the signal channel. A normalizing procedure, with individual correction factors to take into account such factors as the length of wire in each thermometer element, allows replacement of elements without recalibration of the instrument. When the instrument is in use, the operator keeps the calibration channel output at the reference value, usually about 1400 F, whereupon signal channel indications are direct-reading.

Since the inductive coupling elements are best suited for transferring information from passive, variable-impedance sensing elements, compatible resistance thermometers were developed concurrently with the design of the inductive elements and electronic circuitry.

The resistance thermometer is contained in a thin-walled tube of inconel approximately 0.040 in. in diameter. Its temperature sensing element consists of a 24-turn coil of 0.001 in. diameter platinum or rhodium wire in a helix about 0.024 in. in diameter and 1/8 in. long; thus the effective temperature sensing area is small. Leads to the winding are heavier, low-resistance, low-temperature-coeffi-



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cient wire. The thermometers are designed for ease of replacement in the event of failure.


The thermometer is usually inserted into a radial hole drilled in the turbine blade. Normally, centrifugal force acting on the structure assures physical "bottoming" of the thermometer against the end of the hole in the blade, providing both mechanical support and thermal contact. Since the unit may be subjected to very high centrifugal forces along the axis of the tube, special precautions are taken

to prevent relative motion between the delicate winding and the point of attachment of the external leads. This is accomplished by embedding the element in "A-417" cement, a ceramic composition developed by the National Bureau of Standards as a protective coating for metals in high-temperature service. Calibration measurements carried out at 1600 F in the absence of force and at 140 F at 40,000 *g's* indicate good adherence, no softening, and no deleterious chemical action with the coil materials used.

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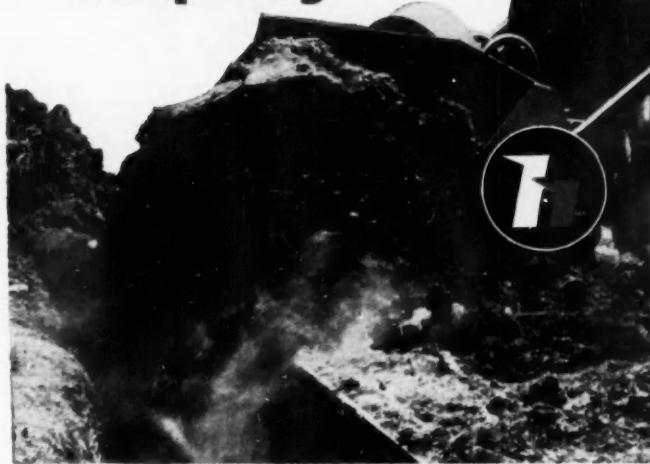
CALENDAR

OF COMING SHOWS AND MEETINGS

- Chicago Automobile Show, Chicago, Ill. Jan. 8-16
- American Road Builders' Association, annual meeting and exhibit, Roosevelt Hotel, New Orleans, La. Jan. 10-13
- SAE Golden Anniversary Annual Meeting and Engineering Display, Sheraton-Cadillac and Statler Hotels, Detroit, Mich., Jan. 10-14
- International Automobile Show, Jersey City, N. J. Jan. 12-16
- Machinery and Allied Products Institute, economic conference, Mayflower Hotel, Wash., D. C., Jan. 14-15
- Forty-fifth Annual National Motor Boat Show, Kingsbridge Armory, New York, N. Y. Jan. 14-23
- Plant Maintenance & Engineering Show, International Amphitheatre, Chicago, Ill. Jan. 24-27
- National Automobile Dealers Association, annual convention, Conrad Hilton Hotel, Chicago, Ill., Jan. 29-Feb. 2
- Detroit Automobile Show, Detroit, Mich. Jan. 29-Feb. 6
- Automotive Accessories Manufacturers of America, annual exposition, Navy Pier, Chicago, Ill. Feb. 7-11
- Society of the Plastics Industry, 10th annual Reinforced Plastics Div. conference, Hotel Statler, Los Angeles, Calif. Feb. 8-10
- Universal Travel & Auto Sports Show, Madison Square Garden, New York, N. Y. Feb. 20-27
- Society of the Plastics Industry of Canada, 13th annual conference, Hotel London, London, Ont., Feb. 22-23
- Pacific Automotive Show, Pan-Pacific Auditorium, Los Angeles, Calif. Feb. 24-27
- SAE Golden Anniversary Passenger Car, Body, and Materials Meeting, Sheraton-Cadillac Hotel, Detroit, Mich. March 1-3
- National Association of Corrosion Engineers, 11th annual conference and exhibition, Palmer House, Chicago, Ill. March 7-11
- SAE Golden Anniversary Production Meeting and Forum, Netherland Plaza Hotel, Cincinnati, O. March 14-16
- ASTE Western Industrial Exposition, Shrine Auditorium and Exposition Hall, Los Angeles, Calif. March 14-18
- Ninth Western Metal Congress and Exposition, Pan-Pacific Auditorium, Los Angeles, Calif., March 28-April 1
- National Fluid Power Association, annual spring meeting, Colorado Springs, Colo. April 5-7
- American Society of Lubrication Engineers, annual meeting and exhibit, Hotel Sherman, Chicago, Ill. April 13-15
- SAE Golden Anniversary Aeronautic Meeting, Production Forum, and Aircraft Engineering Display, Hotels Statler and McAlpin, New York, N. Y. April 18-21
- International Motor Show, Turin, Italy April 20-May 1

Faster work cycles, more work...

Contractors demand equipment with a **Fuller torque converter coupling**



Two workhorses in construction equipped with Fuller Torque Converter Couplings: Hough Model HM PAYLOADER (above), Pettibone Mulliken SPEEDALL, Front End Loader (right).

The performance of Fuller Torque Converter Couplings has been instrumental in helping contractors win the battle of competition, meeting contract deadlines, and offsetting rising costs of operation.

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If you are looking for equipment that offers *profit-plus performance* . . . look for equipment with a Fuller Torque Converter Coupling installed as the power transmission component. Write for descriptive folder.

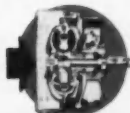
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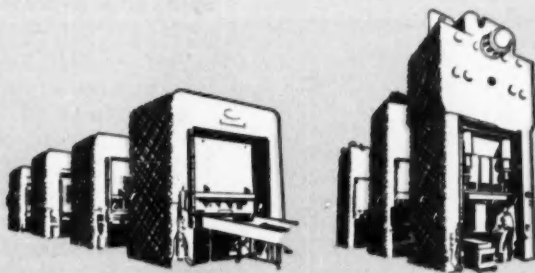
automation and safer operation; cooler running, longer-wearing clutch and brake. From bed to crown, every Danly press is engineered for dependable performance.

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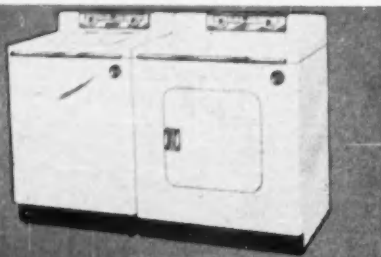


Danly offers any press you need . . . single, double or triple action . . . overdrive or underdrive. Make your press line a Danly line and save costs at every stage of your operation from blanking to finished stampings.

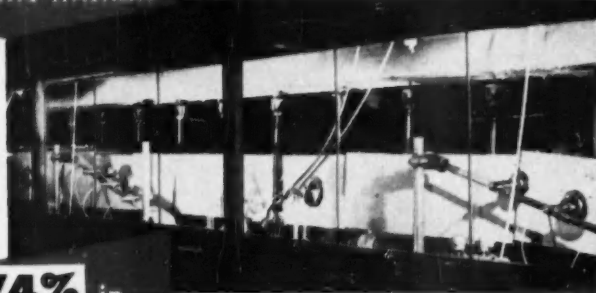
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Production is increased and quality of the work is improved over former hand spray method

● When General Electric formerly hand sprayed their home laundry equipment—automatic washers and dryers—they painted 9.74 washers with a gallon of paint. Now, in the new and modern plant at Appliance Park, Louisville—where they're using the Ransburg No. 2 Process—they get 17.97 units per gallon of paint. An increase of 84%!

And, where they formerly got 5.49 dryers per mixed gallon of finish, now—with the Ransburg No. 2 Electrostatic Spray Process—they get 9.56 dryers per gallon of paint. An increase of 74%!

Along with increased production, G.E. is getting a more uniform, higher quality finish. Another typical, on-the-job-example of the unmatched efficiencies of the Ransburg No. 2 Process of electrostatic spray painting!

Want to know what Ransburg Electrostatic Processes can do for you in your finishing department? Ask about the complete facilities for test-painting YOUR products—under simulated production conditions—in Ransburg laboratories.

Ransburg

ELECTRO-COATING CORP.

Indianapolis 7, Indiana



SHORTIES

During 1953, Americans received a national income of nearly \$600,000 a minute. Out of this they paid Federal taxes at the rate of \$135,000 a minute plus \$38,000 a minute to state and local tax collectors.

Today more than 200,000 U. S. service stations compete for the motorist's business.

The average Russian uses only 76 gallons of oil products a year, while the average American uses 739 gallons.

More than 1.5 billion persons travel more than 4.8 billion miles in about 76,500 fleet-owned taxicabs annually in the U. S.

A six-jet bomber recently flew the equivalent of 15 times around the world without overhaul of any of its six engines.

Since the end of World War II, the U. S. oil industry has re-invested more than \$28 billion in its operations.

About 92 per cent of all farm products move to their first markets in oil-powered trucks.

Every gallon of modern gasoline contains from 3500 to 5000 different chemical compounds made up of hydrogen and carbon.

The gradual development of higher octane gasolines and higher compression ratio automobile engines eventually will save American motorists about \$750 million a year.

The investment of the oil industry in tools and facilities is estimated at \$43 billion. This is enough to buy the Pentagon—the world's largest office building — more than 518 times.

One source

FOR YOUR CASTING REQUIREMENTS

CWC

one book

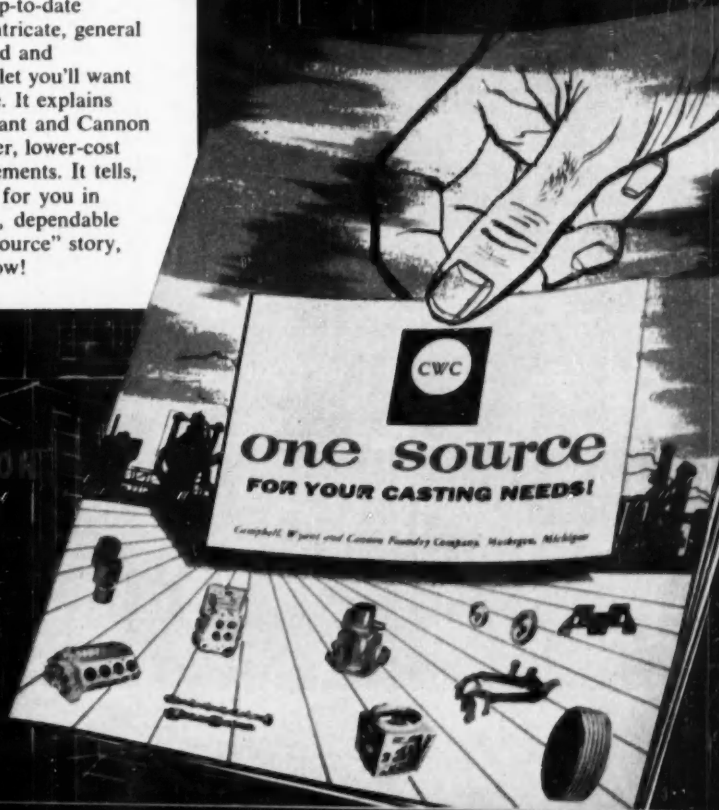
WILL GIVE YOU THE WHOLE STORY

WRITE FOR IT TODAY!

Here is a 24-page booklet that contains the most up-to-date information on gray iron and steel castings: intricate, general purpose, those with special properties, heat-treated and centrifugal. Called "One Source," it's a booklet you'll want to read and keep as an important casting reference. It explains just what one-source supply by Campbell, Wyant and Cannon can mean to you, how it assures you of better, lower-cost castings... no matter what your quantity requirements. It tells, too, how CWC one-source responsibility works for you in terms of thorough and continued service... fast, dependable delivery. Of course there's more to the "One Source" story, *much more*. Write for your copy now!

FOUNDRY COMPANY

Muskegon, Michigan



ON OUR WASHINGTON WIRE



Navy officials may be preparing to place heavy orders for new type jet planes in the wake of cancellation of \$372 million in contracts for two types of jet

fighters, jet engines, and other components. Pentagon officials, however, are remaining silent on where the new contracts might be placed.

Abstracts of 644 Government-owned patented inventions relating to military ordnance have been published by Small Business Administration in a new booklet entitled "Ordnance." Copies are available at \$2 each from Office of Technical Services, Dept. of Commerce, Washington 25, D. C.

More personal spending and less saving by the consumer are seen for 1955 by Government forecasters. They also predict upturn in employment, wages, and business. Sales are expected to be somewhat better than those of this year, but business generally may lag behind the 1953 pace.

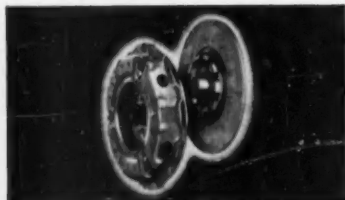
The Government's mobilization program, including stepped-up production capacities, stockpiles, and emergency controls, is said to be a long way toward achievement. Estimated deliveries in the next 12 months are \$21.7 billion.

Hints on analyzing plants and preparing for rapid recovery of production following an enemy attack have been published by Defense Dept. Copies of the publication, "Industry Guide to Planning for Restoration of Production," are available for 35 cents each from Superintendent of Documents, Washington 25, D. C.

Air Force has plans for a giant turboprop transport plane capable of transoceanic flights with a payload of 80 tons. When such a transport may be ready for testing is still a matter of conjecture.

New division of Commerce Dept. is currently spending \$5 million to put the Government into some 30 trade shows. Efforts will be made to expand participation by American industry in important expositions.

CLUTCH KNOW-HOW AT YOUR SERVICE



ROCKFORD CLUTCH engineers have designed clutches, power take-offs and speed reducers for hundreds of different products. This wide experience can help solve your power transmission control problems. Just send a description or print of your needs for their recommendations.

SEND FOR THIS HANDY BULLETIN Shows unique ROCKFORD CLUTCH and POWER TAKE-OFF applications. Contains diagrams, dimensions, capacity tables, etc.

ROCKFORD CLUTCH DIVISION
Borg-Warner Corporation
315 Catherine Street, Rockford, Illinois

ROCKFORD CLUTCHES





FROM TAKE OFF...

Whenever an American jet needs a burst of extra speed — whether to get upstairs *fast* . . . to pull up and away after a “wave off” . . . or to flash out of the clouds on an approaching invader — it's the afterburner that adds the power boost! *And with CECO Afterburner Controls to govern afterburner thrust, extra power for speed bursts can be counted on when needed.* The engineering and production of dependable afterburner fuel controls for jet engines is but one of many CECO contributions to America's aerial supremacy.

CECO can supply you with superior jet engine controls from present designs — or with special controls developed specifically to meet your engine requirements.



CHANDLER-EVANS

DIVISION NILES-BEMENT-POND COMPANY
WEST HARTFORD 1, CONN., U.S.A.

PIONEER PRODUCERS OF

JET ENGINE FUEL CONTROLS • AFTERBURNER REGULATORS
PUMPS • SERVOMECHANISMS • CARBURETORS • PROTEK-PLUGS



TO TOUCHDOWN





Bundyweld performs faithfully in the hydraulic brake control system of these Caterpillar Diesel No. 112 Motor Graders.

Famed Caterpillar-built products use Bundyweld for vital tubing parts



WHY BUNDYWELD IS BETTER TUBING



Bundyweld starts as a single strip of copper-coated steel. Then it's . . .



continuously rolled twice around laterally into a tube of uniform thickness, and



passed through a furnace. Copper coating fuses with steel. Result . . .

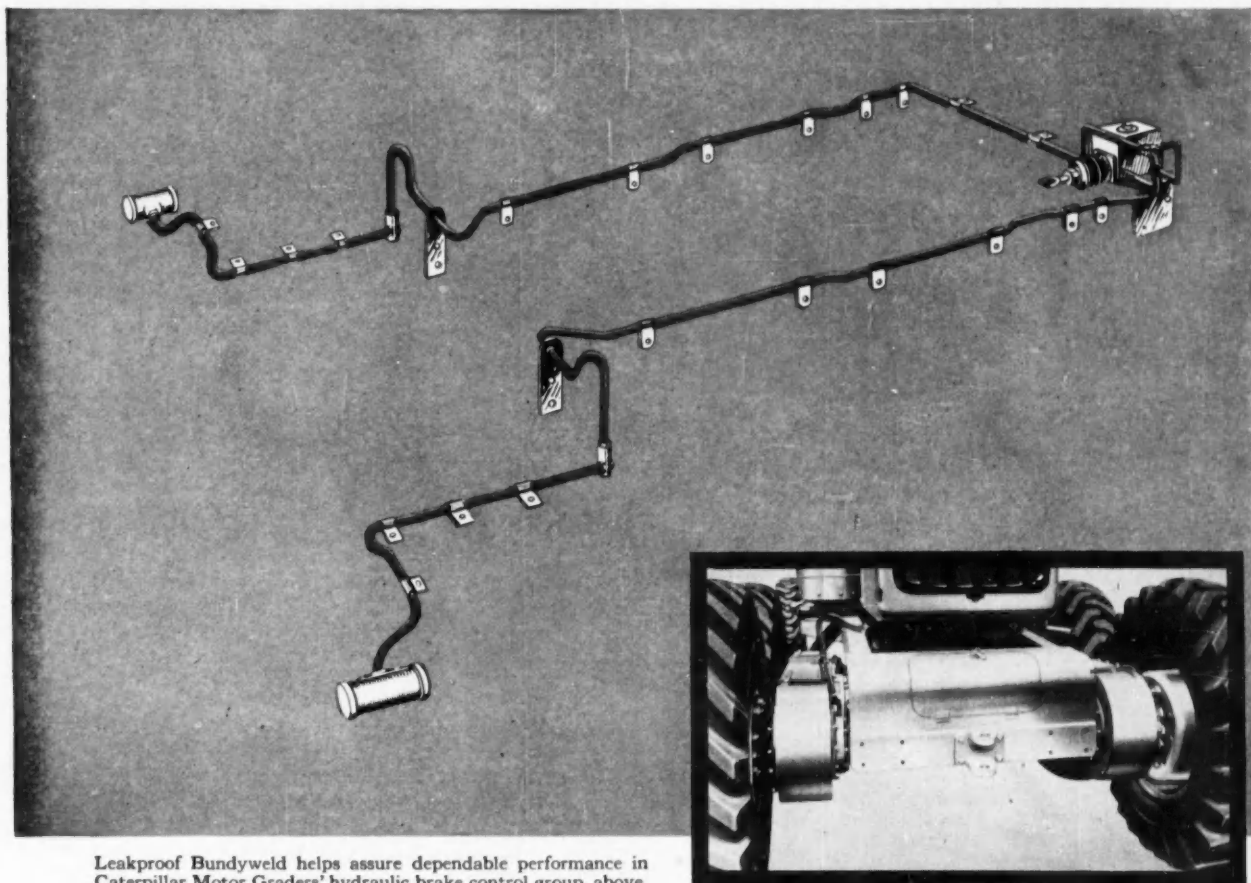


Bundyweld, double-walled and brazed through 360° of wall contact.



SIZES UP
TO ¾" O.D.

NOTE the exclusive Bundy-developed beveled edges, which afford a smoother joint, absence of bead and less chance for any leakage.



Leakproof Bundyweld helps assure dependable performance in Caterpillar Motor Graders' hydraulic brake control group, above. Inset: closeup of tandem drive showing part of brake system.

On sea and on land, in forests or on farms, on construction projects around the globe — Caterpillar Tractor Co.'s powerful, dependable machines can be found, dynamic symbols of industrial progress.

One significant factor in Caterpillar's dramatic expansion has been the company's insistence on the reliability of its products. *That's why Caterpillar uses dependable Bundyweld Tubing for oil, brake, gas, transmission, other vital tubing lifelines.*

Here's why you, too, can always put your faith in Bundyweld:

The tubing itself: This quality tubing is double-walled, copper-bonded throughout 360° of wall contact. It's leakproof; thinner walled, yet stronger; takes easily to intricate fabrication operations; takes standard protective coatings; has high bursting strength.

Bundy extras: Solving tubing problems is old stuff to Bundy's staff of expert engineers, who enjoy showing our customers ways to save time, materials, money. Bundy's unexcelled fabrication services are at your service, to produce perfectly formed parts exactly to your requirements. If you fabricate your own tubing parts, Bundy is prepared to ship you clean, bright, ready-to-use tubing, on time, exactly to your specifications.

Why not follow the example of the hundreds of industrial leaders who regularly use Bundyweld lifelines. Call, write or wire for data or for help with your tubing headache.

**BUNDY TUBING COMPANY
DETROIT 14, MICHIGAN**

BUNDYWELD TUBING®

DOUBLE-WALLED FROM A SINGLE STRIP

Bundy Tubing Distributors and Representatives: Bridgeport, Conn.: Korhmel Steel & Aluminum Co., 117 E. Washington St. • Cambridge 42, Mass.: Austin-Hastings Co., Inc., 226 Binney St. • Chattanooga 2, Tenn.: Peirson-Deakins Co., 823-824 Chattanooga Bank Bldg. • Chicago 32, Ill.: Lopham-Hickey Co., 3333 W. 47th Place • Elizabeth, New Jersey: A. B. Murray Co., Inc., Post Office Box 476 • Los Angeles 58, Calif.: Tubesales, 5400 Alcoa Ave. • Philadelphia 3, Penn.: Rufan & Co., 1717 Sansom St. • San Francisco 10, Calif.: Pacific Metals Co., Ltd., 3100 19th St. • Seattle 4, Wash.: Eagle Metals Co., 4755 First Ave., South • Toronto 5, Ontario, Canada: Alloy Metal Sales, Ltd., 181 Fleet St. East. Bundyweld nickel and Monel tubing are sold by distributors of nickel and nickel alloys in principal cities.



develops a new approach to SURFACE FINISHING

ROTO-FINISH has now extended the original barrel finishing process to include entirely new special fixture machines and equipment. These machines represent a radically new departure from the generally accepted conception of barrel finishing machines, made possible only by Roto-Finish extensive experimental facilities and long experience with modern, precision surface finishing processes. And these new special fixture machines prove that there are no limits to the size or shape of parts which can be successfully processed with proper equipment, materials and methods.

The new engineering developments which have taken place in the Roto-Finish laboratories open the door wide to entirely new applications and entirely new principles in mechanical surface finishing. Therefore, whatever your finishing problem, we urge you to ship us two finished and several unfinished samples of parts you may wish to have us process in our laboratories. Remember, Roto-Finish guarantees the same result in your shop, as on the samples processed in their laboratories.

Get this new
FREE CIRCULAR →

Roto-Finish
3713 MILHAM ROAD, KALAMAZOO, MICH.



COMPANY

P. O. Box 988 —
Phone 3-5578

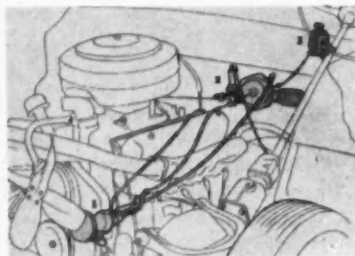
It's the finish that counts

NEW ACCESSORIES

Relieves Right Leg

Auto Cruz, announced by C. K. McCullough Co., Inc., 1307 E. Cross St., Anderson, Ind., is designed to allow a set road speed without use of the accelerator pedal.

Three basic units comprise the system, the first of which is the speed sensing or metering unit. It is composed of two fly weights driven in relation to engine speed and thence road speed. These weights operate a vacuum pilot valve moving its land from one port to the other, thereby changing the admission of vacuum to a diaphragm from one side of the diaphragm to the other. Springs oppose the force of the weights and tend to return the pilot valve against the weights as the speed decreases, which allows the spring to be the ascendant factor.



Attached to the speed sensing unit is a lever through which it is possible to remotely vary the rate of the spring by putting more pressure against it through this lever.

The second unit is the vacuum-assisted servo. The sensing unit meters vacuum or air, as required, to the diaphragm of the servo. The servo then increases or decreases the speed of the engine through a suitable control running to the throttle rod connector. Also attached to the servo is a device called the hydraulic de-clutcher; it assures that when the brake is applied the system is disengaged. Through means of a piston in this unit, hydraulic pressure raises the internal lever on its pilot shaft so that it clears a protruding screw on

(Turn to page 142, please)

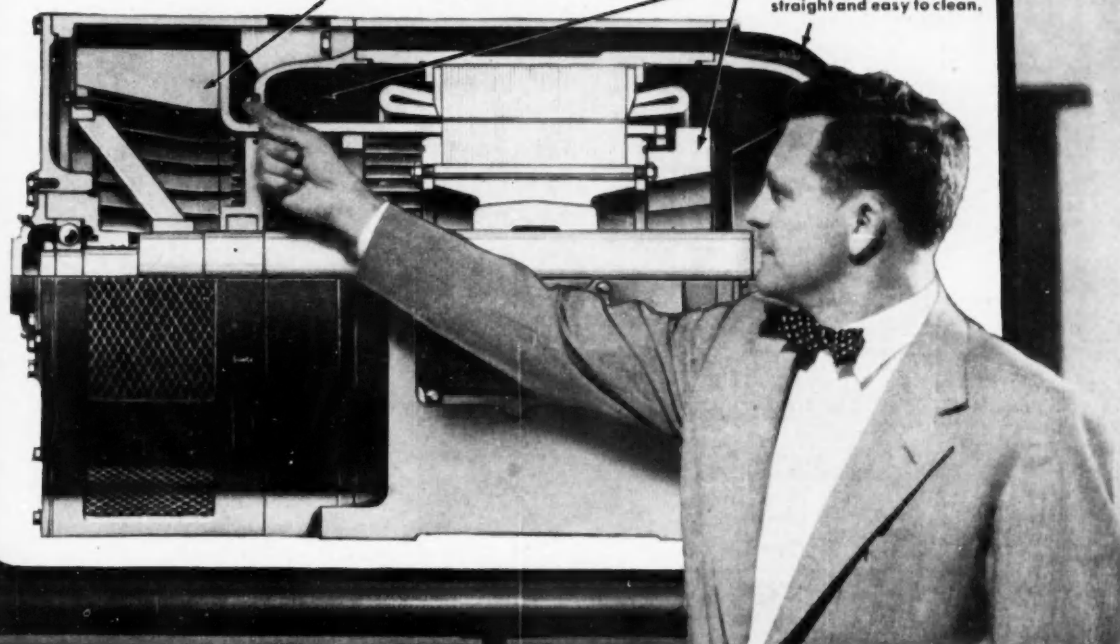
In G-E Motors heat develops here . . . instead of here

Heat develops in radial fan outside stator assembly—lowering operating and maintenance costs.

In conventional motors, heat develops inside stator assembly—necessitating larger frame sizes and separate blowers.

Internal fan and baffling facilitate heat transfer.

"Straight-through" air flow provides efficient cooling; air passages are straight and easy to clean.



BY SOLVING THE ROTOR HEAT PROBLEM . . .

General Electric lowers maintenance and operating costs for punch press motors!

The new General Electric Type KRX motor is engineered and designed for the toughest heavy-duty press applications. Their outstanding performance has already been established on punch presses of many automotive plants—providing greater operating efficiency by overcoming the disadvantages of conventional motors.

THE ROTOR HEAT PROBLEM—In the ordinary high-slip induction motor, high resistance rotor bars build up heat in the enclosed stator assembly causing high internal losses and reduced efficiency.

The bulk of heat developed can dissipate into the air stream only by "soaking through" the stator assembly—necessitating either greatly increased frame sizes or separate ventilating blowers that increase your operating costs.

GENERAL ELECTRIC'S SOLUTION—In solving this problem, G-E engineers constructed rotor bars of low resistance copper—as in a low-slip motor—within the enclosed stator assembly to keep internal losses at a minimum.

The rotor bars were extended to form a radial fan of high resistance material. Thus, the rotor heat is generated in the radial fan *outside* the enclosed stator assembly and away from the electrical parts of the motor.

This system eliminates troublesome accessories, reduces handling, installation, and maintenance costs, and increases operating efficiency for longer years of service.

FOR MORE DETAILED INFORMATION contact your nearby G-E Sales Representative, or write for Bulletin GEA-5968 to General Electric Co., Section 830-13, Schenectady 5, New York.



THE RUGGED CAST-IRON FRAME, and rigidly bolted end shields of this G-E Type KRX motor provide positive totally enclosed protection.

GENERAL  ELECTRIC

In the Spicer tradition

DANA CORPORATION

looks ahead
to another 50 years of progress

We are now starting our second 50 years of Spicer research . . . planning . . . development and advancement.

The beginning of this new Spicer era is sparked by a particular brand of courage. An inheritance of "git-up-and-go" from the pioneers who made the Spicer and Dana names world-famous:

CLARENCE W. SPICER, who invented and mass-produced the first universal joint for automotive vehicles.

CHARLES A. DANA, whose wisdom of decisions has welded together the big family of Spicer-Dana plants and products.

RALPH E. CARPENTER, who helped pilot the Spicer-Dana ship on a true course, through peace and war, through good times and bad.

Today, Spicer has available a 10-plant organization that embodies some of the most advanced efficiencies in the world. Spicer engineers are now on a program announcing a wide range of new and improved products. Many of these are revolutionary in performance. Spicer administration, sales and service have been sparked by new executives . . . new plans . . . *new action* in every department.

Action . . . that's what we promise you all along the line. Action . . . working together hand in hand with designers and engineers on vehicles of the future. Action . . . that will continue to develop power transmission units destined to further heighten the Spicer reputation as

"The Standard of the Industry"

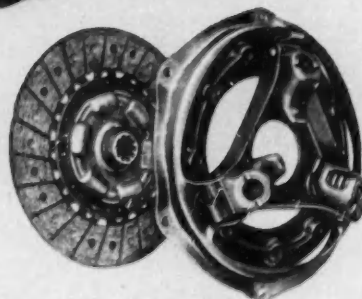
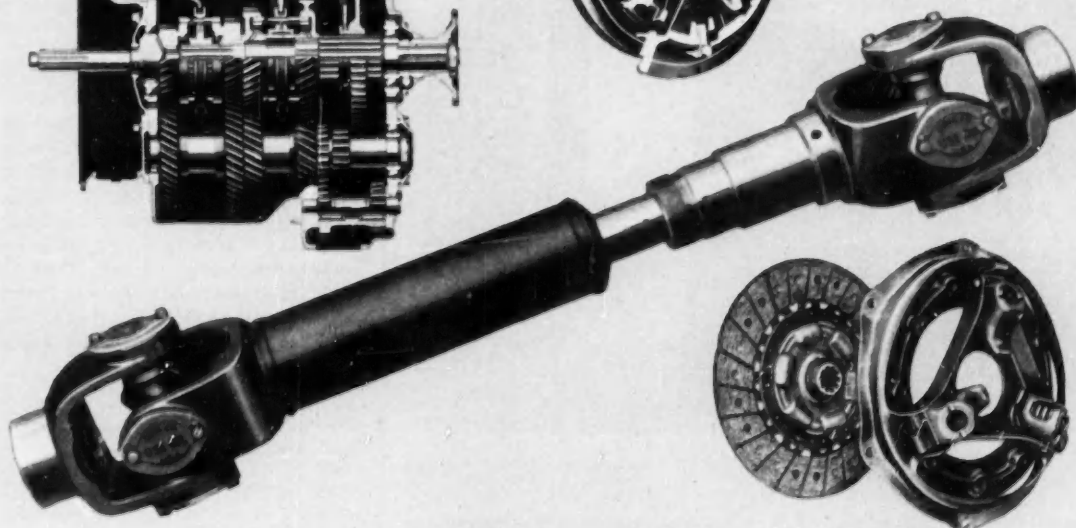
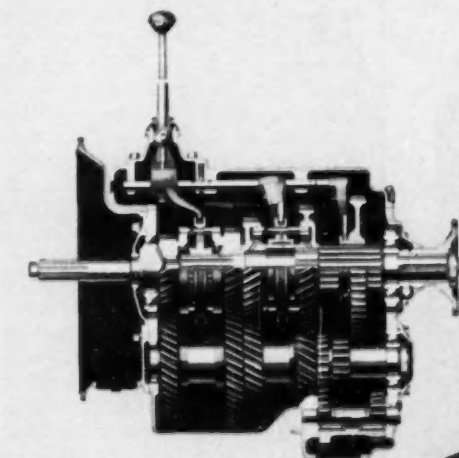
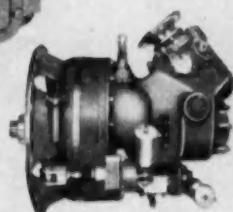
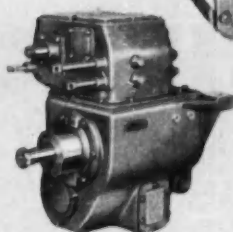
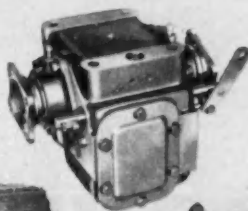
DANA CORPORATION • TOLEDO 1, OHIO



SPICER PRODUCTS: TRANSMISSIONS • UNIVERSAL JOINTS • PROPELLER SHAFTS
• AXLES • TORQUE CONVERTERS • GEAR BOXES • POWER TAKE-OFFS •
POWER TAKE-OFF JOINTS • RAIL CAR DRIVES • RAILWAY GENERATOR
DRIVES • STAMPINGS • SPICER and AUBURN CLUTCHES • PARISH FRAMES



Clarence W. Spicer



New Accessories

(Continued from page 138)

the control lever. This then allows one lever to operate independently of the other since the protruding screw head on the control lever slides freely under the declutched lever, only re-engaging when one or the other members have been re-positioned so that the engagement point on the servo lever and the screw head on the throttle lever are in line to reseat themselves.

The third unit, a selector or variable speed control lever on the dash, is quite simple and needs no lengthy discussion. It is a friction spring-loaded quadrant so established as to hold its position when set at any predetermined point. This member is connected through the servo unit to the sensing unit with a flexible borden or choke wire cable and housing.

Map Roller

This combination map holder and sun visor is announced by Rockford

Engineered Products Co., 2324-23rd Ave, Rockford, Ill. Known as the Repco Map-visor, the unit is said to be readily attached to any car, taxi, bus or truck. It's supplied complete with five specially designed Rand-McNally sectional maps covering the



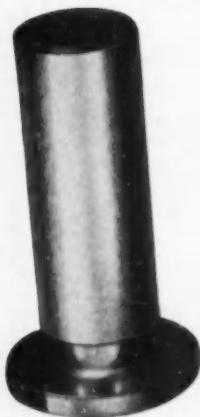
entire U. S. It is finished in a neutral-color plastic case and polished aluminum trim. The deluxe model is illuminated with indirect lighting. The device may be mounted on either the left or right side in place of the standard sun visor. It may be detached and held while traveling. To pin-point the exact route of travel, top and bottom sliding pointers can be set as desired.



JOHNSON *Tappets*

"fill the exacting requirements
of today's engines"

Higher horsepower and higher compression put heavier loads on the tappets. Johnson quality assures you the performance you want from these vital engine parts.



Fuel Oil Filter

A fuel oil filter for final-stage use on Diesel engines, designated as Type FSA-10A-1, removes from fuel oil the last tiny particles of dirt which, although microscopic in size, can cause expensive wear on the internal lapped surfaces of Diesel fuel injection equipment. Utilizing an improved, denser type of filtering material, the FSA-10A-1 filter removes abrasive particles down to those less than two microns in size, and this filtering efficiency improves with use. The filtering element is said to be water resistant so that if any water should be present in the fuel oil the filter's effectiveness will not be impaired. It is of sealed construction. A built-in check valve is provided to prevent the possibility of incorrect installation as regards direction of oil flow. Fuel oil can pass through the filter only in the direction in which the filtering action is most effectiveness. American Bosch Div., Springfield 7, Mass.

Tachometer

A switch or sending unit which makes possible the installation of Stewart-Warner electric tachometers on a still wider range of passenger cars, trucks and marine and stationary engines has been announced by (Turn to page 144, please)

"Tappets are our business"


JOHNSON  PRODUCTS

INC.

MUSKEGON, MICHIGAN

**SIGN OF SUPERIORITY
SYMBOL OF SINCERITY**



 **THE SEASON'S SINCEREST GREETINGS TO AMERICA'S GREAT INDUSTRIES**

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A name to

Remember



The next time you're taking estimates on new presses let the Warco representative in your area give you the facts that have caused more people to buy Warco Presses the past year than ever before.

A few minutes with a Warco representative is all you'll need to see why the added quality designed and built into Warco Presses guarantee extra life at lower maintenance costs. You'll be introduced to many features, exclusive with Warco, that spell added safety, less operator fatigue and greater press speeds.

Too, your Warco representative is a specialist who'll work with you in getting a press that will do the most efficient job per dollar invested. And, you'll appreciate, like hundreds of others, the johnny-on-the-spot after sale service for which Warco representatives are noted.

So, next time you think of presses be sure you have the Warco story — it will pay you in the long run. Warco representatives located in all principal cities.

THE FEDERAL MACHINE & WELDER COMPANY

WARREN, OHIO



New Accessories

(Continued from page 142)

the Instrument Div. of Stewart-Warner Corp., 1826 Diversey Pkwy., Chicago 14, Ill. The new switch, Model 762-S, makes installation possible on Mallory distributors. When the electric tachometer was announced two years ago, it was possible to install it on certain Auto-Lite, Delco-Remy and Holley distributors. Since then the number of switches and subsequent applications has increased to the point where now with the addition of Mallory distributors, Stewart-Warner electric tachometers can be applied to practically anything on the road.

Blade for Curves

The Anco Cobra windshield wiper conversion for wrap-around windshields is shown installed on a 1954 Cadillac. The long sweep of the wipe pattern travels across the front of the shield and around the wrap-around is said to provide an improved view of the road ahead, and of cross traffic



and stop signs. Cobra holds blade constantly true to the windshield, thus avoiding over-tilt and consequent mutilation of the windshield. Conversion kits contain two Cobra-Arm—Turtleback-Blade Combinations and two refills, according to the company, as well as a precision motor conversion to provide longer travel of blades around the corners. The Anderson Co., Gary, Ind.

Sintered Oil Filter

A permanent all-metal oil filter, originally developed for aircraft and guided missiles, is being introduced for automotive use. Made of sintered bronze, the Micro Bronze filter is shaped in a double-cone design and is claimed to screen out abrasives and metal particles as small as 39 millionths of an inch. In addition, the filter contains a patented acid neutralizer. It is offered by Micro Bronze Filter Corp., 11766 W. Pico Boulevard, Los Angeles 64, Calif.



This FREE BOOK CAN HELP YOU CUT COSTS!

There's something new in this year's cars . . .

IT'S THE DAREX Flowed-in GASKET PROCESS!

And this fact-filled brochure gives you the whole Flowed-in Gasket Story. Here are a few samples of the things you'll read in this informative new book:

ABOUT COSTS

Using the DAREX Flowed-in Gasket Process, a major manufacturer is saving \$50,000 per year in labor and materials on a single gasketing operation. As a result of this striking cost reduction, the firm has recommended the DAREX Process for several more gasketing operations.

ABOUT THE PROCESS

The Flowed-in Gasket Process is a new application of a method of sealing developed by Dewey and Almy researchers over 30 years ago, and successfully used in food container manufacture ever since.

The DAREX Flowed-in Gasket Process is more than a sealing compound . . . more than a machine . . . more than an engineering service . . . *it's a complete Process!* So when you switch to Flowed-in Gaskets, you get all three.

Compounds—Over 800 formulations available to meet most needs. Or Dewey and Almy chemists will develop a "job-tailored" compound for you.

Machines—To apply the compound, Dewey and Almy designs and builds machines based on more than 30 years' field experience.

Service—Every machine is precisely adjusted to your specifications before it leaves the shop. When it arrives, a Dewey and Almy Engineer is on hand to install and adjust the machine. Then he trains your operators to full proficiency. And whenever you need him, the Dewey and Almy Man is at your service.



DEWEY and ALMY Chemical Company

Cambridge 40, Mass.

Offices or subsidiaries in Buenos Aires, Chicago, Copenhagen, London, Melbourne, Milan, Montevideo, Montreal, Naples, Paris, San Leandro (Calif.), Sao Paulo, Tokyo.

Discover what DAREX "Flowed-in" GASKETS can do for YOU

MAIL THE COUPON TODAY!

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Please send me the new DAREX Flowed-in GASKET Book.

Name

Firm

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City

State

Free LITERATURE

(Continued from page 90)

Furnace Controls 22

Condensed catalog and price list 54-1 contains instruments and controls applicable to industrial furnace

and oven equipment, 44 pages. *Minneapolis-Honeywell Regulator Co., Industrial Div.*

Hand, Foot Valves 23

The line of 600 and 880 series hand and foot valves for 125 psig air service are depicted in bulletin 303-B, 20 pages. *Ross Operating Valve Co.*

Data System 24

Vic-Dar is an electronic data accumulation and reduction system with

20 channels. It converts analog signals to data for card punch or computer. Four-page folder 671. *Victor Adding Machine Co.*

Honeycomb Core 25

Marbond honeycomb construction is explained in an illustrated 34-page brochure, MR6692. *Glenn L. Martin Co.*

High-Strength Alloy 26

Physical properties and processing data for a number of high-strength heat and corrosion resistant materials are given in a 22-page booklet, 5M54. *Universal Cyllops Steel Corp.*

Die Casting 27

Information for the designer of zinc, aluminum, magnesium and copper die casting is available in a handy 8-page booklet from the *American Zinc Institute*.

High-Speed Cameras 28

Framing cameras capable of 1.2 and 2.4 million frames per second are described in a four-page folder, 189, published by *Beckman & Whitley, Inc.*

Epoxy Casting Data 29

A description of epoxy type casting resins and techniques for casting tools are described in technical bulletin No. 22. *Houghton Laboratories, Inc.*

Automotive Heaters 30

Automotive Heater Principles is the subject of an engineering discussion in Volume 15, No. 5 of *Engineering Forum*. *Eaton Manufacturing Co.*

Story of PowerFlite 31

A history of Chrysler Corp. semi-automatic transmissions and PowerFlite is the subject of Volume 40, No. 11 of *Lubrication*. *The Texas Co.*

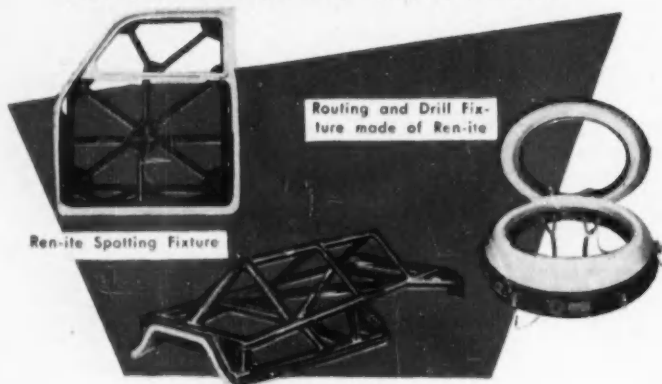
Plastic Sheetting 32

Formable sheet stock glass filament reinforced plastic for molding is described in a six-page leaflet. *Minnesota Mining and Manufacturing Co.*

SAVE • Tooling TIME - 70% • Tooling COSTS - 50%

The *First* Dimensionally Stable Tooling Plastic for

- STRETCH PRESS, HYDROFORM AND DROP HAMMER DIES
- MASTER CONTOUR BLOCKS
- CHECKING FIXTURES
- DRILL AND ROUTER FIXTURES AND MANY OTHER APPLICATIONS THROUGHOUT THE TOOLING INDUSTRY



Canopy Opening Checking Fixture, showing the use of Ren-ite Plastic stock tubing

REN-ITE is a modified Epoxy thermosetting resin for use as a laminating plastic without application of heat or pressure for general tooling applications. Cured, non-toxic, non-corrosive, easy to patch, not brittle, bonds to any material. Packaged in premeasured cans, complete with resin and hardener for immediate convenient use. We invite you to try Ren-ite products in your tooling program. Write for further information and price schedules on complete Ren-ite line.

- FREE ENGINEERING SERVICE—NO CONTRACTS REQUIRED •

Ren-ite
PLASTICS, INC.

POST OFFICE BOX NO. 1256, LANSING 4, MICHIGAN
OFFICES IN CHICAGO, CLEVELAND, DETROIT,
LOS ANGELES, NEW YORK AND ST. LOUIS.

*"Ren-ite," "The Dimensionally Stable Tooling Plastic" and "Comminuted for Quality" are Trademarks of Ren-ite Plastics, Inc.



Buhr

SPECIAL...

Drills, reams, countersinks, rough-bores and taps
all holes in 99 flywheel
 housings an hour!

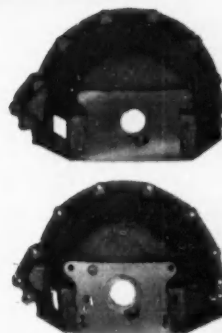


And it performs 42 operations on each part!

That's the 80%-efficiency production rate of this Buhr
Special 5-way dial-type hydraulic-feed drilling and
individual-lead-screw tapping machine.

Equipped with 60"-diameter 5-station power-operated automatic
index table with shot bolt . . . Automatic hydraulic
power clamping on fixtures.

Parts of this Buhr Special, all held to tolerances,
are completely interchangeable — all component assemblies located
by precision-bored dowels — standard Buhr manufacturing technique.



Buhr

MULTIPLE-SPINDLE
HIGH PRODUCTION MACHINERY

Let us show you other Buhr Specials.

*A phone call, telegram or letter will bring you a consultation with
one of our sales executives — or our 48-page Catalog.*

BUHR MACHINE TOOL CO.

ANN ARBOR, MICHIGAN

Solidly Engineered • Precision Built • for World's Leading Manufacturers



**YOU
NAME IT-**



FELT

by **FELTERS**

will do it...

Filters
Auto parts
Washers
Noise dampeners
Wicks
Packings
Liners
Electrical appliances
Aircraft parts
Shock absorbers
Vibration controls

(Your product goes here)

Resiliency that permits constant spring-back to original shape . . . and good absorptive characteristics . . . are just two of the many properties you can get in Felt made by Felters.

If you have a problem that could be solved by a soft, porous material, or by a hard, dense material — your answer could well be a Felt made by Felters.

The "Felters Design Book" describes several usual and unusual uses for Felt. Drop us a line and we will send you a copy.

HEARD ABOUT UNISORB® — THE MODERN MACHINERY MOUNTING?

The **FELTERS** Company
253 South Street, Boston 11, Mass.



(Continued from page 37)

Pennsylvania Salt Manufacturing Co. has acquired all patents and assets of Gilron Products Co., producer of drawing compounds and metal cleaners. Stockholders have also approved a plan for acquisition of I. P. Thomas & Son Co., commercial fertilizer producer.

* * *

DuPont is planning to expand its poly-isocyanate facilities. The company has also disclosed development of a new Estersil GT grease thickener.

* * *

Micro Switch Div. of Minneapolis-Honeywell Regulator Co. has opened a new research and product development center in Denver, Col. . . . J. B. Rea Co. has opened a new analog computation center in Santa Monica, Calif.

* * *

Tung-Sol Electric Inc. plans a new issue of 100,000 shares of convertible preferred stock at \$50 par value. . . . Goodyear Tire & Rubber Co. is seeking stockholder approval of a two-for-one split of its common stock.

* * *

John Deere is now in production on its new Models "70" Row-Crop and Standard Diesel Tractors. Power steering is offered as optional equipment.

* * *

Gould-National Batteries, Inc., is readying plans to assemble its new electrically powered delivery truck.

* * *

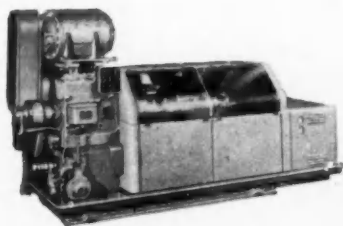
John C. Whidett Co. is entering the industrial market as a planner, designer, and builder of automatic control units. The company is located in Bala-Cynwyd, Pa.

* * *

Assembly of a press 165 ft long for hollow steel propeller blades is nearing completion at a Curtiss-Wright plant in Buffalo, N. Y. . . . Gerity-Michigan Corp. has installed a new automatic electroplating machine, 160 ft long and 16 ft high, in its Adrian, Mich., plant.

* * *

Ethyl Corp. plans to spend over \$1 million in an expansion of its research facilities and technical services to the oil industry.



FOR THE

LONG PULL

A 3-WAY MARKETING SERVICE FOR USERS OF MACHINE TOOLS

Jones & Lamson now offers a choice of ways whereby you can acquire new machine tools... on terms best suited to your own needs. In addition to outright purchase, with its obvious advantages, we offer a "Pay-from-Productivity" plan, on a 1-to-5 year basis, at interest rates as low as $3\frac{1}{4}\%$ *. This plan is designed for companies that prefer to finance modern machine tools out of the actual additional earnings these tools produce. Also, a lease plan — in 4 optional forms — for companies that lack the full cash purchase price, or have more pressing uses for their capital.

* (add-on rate)

JONES & LAMSON MACHINE CO.

523 Clinton St., Springfield, Vermont, U.S.A.

UNIVERSAL TURRET LATHES • FAY AUTOMATIC LATHES • AUTOMATIC DOUBLE-END MILLING & CENTERING MACHINES
AUTOMATIC THREAD & FORM GRINDERS • OPTICAL COMPARATORS • AUTOMATIC OPENING THREADING DIES & CHASERS

More Defense Contract Awards

THIS latest list of defense prime contracts that have been awarded covers the period from October 26 to November 23, 1954. Items included in this list are for various types of automotive military equipment, including tanks, motorized gun carriages, trucks, airplanes, automotive components and spare parts, automotive maintenance equipment, etc.

ACF INDUSTRIES, INC., New York, N. Y.
Spare parts for mount, T67E1—Various—
\$182,944—Used on the self-propelled
Howitzer carriage, 105MM, T98E1

AEROL CO., INC., Los Angeles, Calif.
Tail wheel—1654 ea.—\$41,267

AIRBORNE ACCESSORIES CORP., Hill-
side, N. J.
Spare parts—Job—\$81,661

AMERICAN MOTORS CORP., Hudson
Motor Car Div., Detroit, Mich.
Mount, machine gun, single 30 caliber—
1200—\$1,548,885
Passenger vehicles—64 ea.—\$105,145

AMERICAN MOTORS CORP., Nash Div.,
Detroit, Mich.
Passenger vehicles—65 ea.—\$106,925



WIRY JOE

WIRE and CABLE

*are better products... cut costs
and improve operating efficiency*

THE CRESCENT COMPANY, INC., PAWTUCKET, RHODE ISLAND

AMERICAN TRACTOR CORP., Churubusco,
Ind.
Fork lift truck—I—\$34,600

AUTOMATIC ELECTRIC SALES CO., Chi-
cago, Ill.
Repair parts—31,467—\$75,725

AUTOMATIC TRANSPORTATION CO., Div.
Yale & Towne Mfg. Co., Chicago, Ill.
Truck magazine, electric boom life—6—
\$35,994

AVCO MANUFACTURING CORP., Lycom-
ing Div., Stratford, Conn.
R-1820-84 engines—\$4,389,980

THE BABCOCK & WILCOX CO., Boston,
Mass.
Titanium alloy—155,558 lb—\$339,382

BEECH AIRCRAFT CORP., Wichita, Kan.
Aircraft—\$4,301,492

BENDIX AVIATION CORP., Bendix Products
Div., South Bend, Ind.
Brake assy—341 ea.—\$86,812
Carburetors—24 ea.—\$37,038

BENDIX AVIATION CORP., Bendix Radio,
Towson, Md.
Switch drive sub. assys—Various—\$32,900

BENDIX AVIATION CORP., Eclipse Pioneer
Div., Teterboro, N. J.
Gyro horizon indicators, spare parts—
2893—\$1,635,182
Maintenance parts—Various—\$38,437
Instruments for various aircraft—Various
—\$31,356

BENDIX AVIATION CORP., Red Bank Div.,
Eatontown, N. J.
Generators—79 ea.—\$40,606

BENDIX AVIATION CORP., Research Lab-
oratories, Detroit, Mich.
Single axis oscillating table and associ-
ated equipment—Job—\$82,445

BENDIX AVIATION CORP., Scintilla Div.,
Sidney, N. Y.
Maintenance parts—Various—\$51,398
Distributor and magneto assys—Various—
\$83,992

BOEING AIRPLANE CO., Seattle, Wash.
Jet tanker aircraft—\$25,000,000

BOEING AIRPLANE CO., Wichita, Kan.
Facilities—\$751,400

CATERPILLAR TRACTOR CO., Peoria, Ill.
Crawler tractor—I ea.—\$22,399
Tractor, spare parts—I ea.—I lot—\$27,
681
Passenger vehicles—2 ea.—\$38,869

CHAMPION SPARK PLUG CO., Toledo,
Ohio
Spark plugs—Various—\$64,996

CHANCE VOUGHT AIRCRAFT, Dallas, Tex.
Starter generators—206—\$82,400

**CHECKER CAB MANUFACTURING
CORP.**, Kalamazoo, Mich.
Replenishment of tactical vehicles—560—
\$2,010,435

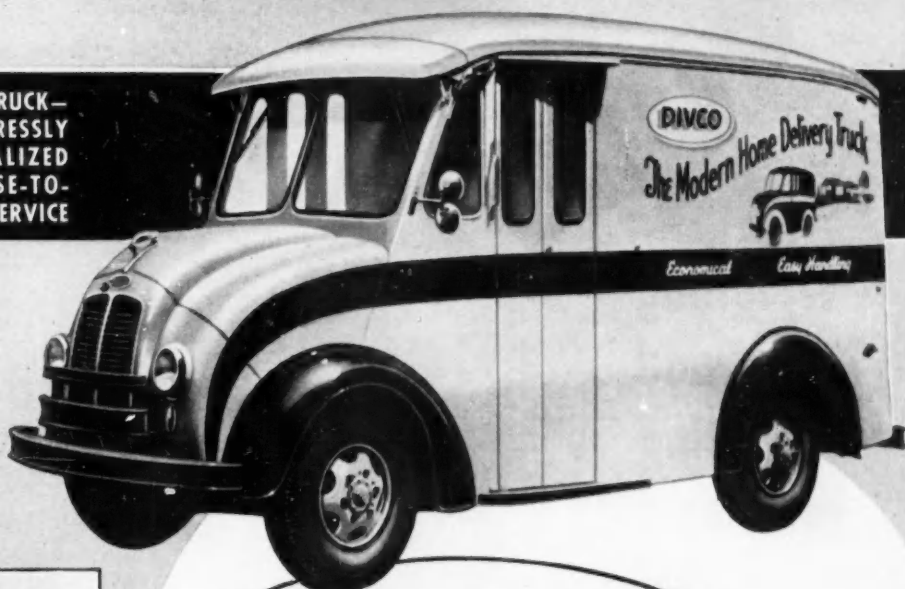
CHRYSLER CORP., Newark, Del.
1800 M48 Tanks (Continental-made en-
gines) 90 MM gun—1800—\$160,601

CHRYSLER CORP., Detroit, Mich.
Medium tank, M47 with spare parts, tanks
T47 with spare parts—\$8,235,500

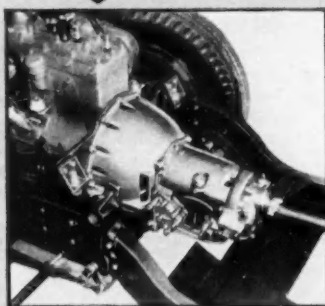
CLARK EQUIPMENT CO., Service Div.,
Jackson, Mich.
Spare parts—32 ea.—\$32,835

THE CLEVELAND PNEUMATIC TOOL CO.,
Cleveland, Ohio
Actuators—Various—\$69,001
(Turn to page 152, please)

**DIVCO DELIVERY TRUCK—
ENGINEERED EXPRESSLY
FOR THE SPECIALIZED
NEEDS OF HOUSE-TO-
HOUSE DELIVERY SERVICE**



**CONTINENTAL
RED SEAL SUPER-
4162 PROVIDES
BUILT-FOR-THE-
JOB POWER**



DIVCO

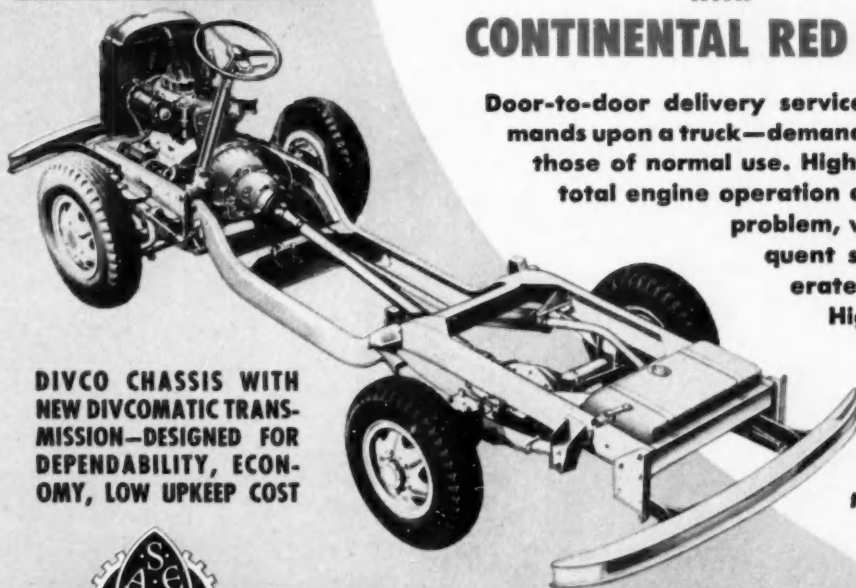
DELIVERS THE GOODS

WITH

CONTINENTAL RED SEAL® POWER

Door-to-door delivery service makes exacting demands upon a truck—demands differing widely from those of normal use. High ratio of idling time to total engine operation complicates the cooling problem, while the far more frequent starts and stops accelerate wear on many parts.

High among the reasons why Divcos deliver more goods at lower cost: new Divcomatic transmission, and built-for-the-job Red Seal power.



**DIVCO CHASSIS WITH
NEW DIVCOMATIC TRANS-
MISSION—DESIGNED FOR
DEPENDABILITY, ECON-
OMY, LOW UPKEEP COST**



Continental Motors Corporation

MUSKEGON, MICHIGAN

6 EAST 45TH STREET, NEW YORK 17, N. Y. • 3817 S. SANTA FE AVE., LOS ANGELES 58, CALIF.
6218 CEDAR SPRINGS ROAD, DALLAS 9, TEXAS • 910 S. BOSTON ST., ROOM 1008, TULSA, OKLA.
1252 OAKLEIGH DRIVE, EAST POINT (ATLANTA) GA.



SOLVED

weighing
and
testing
problems
by



EMERY force-measuring systems

Emery load cells offer the fundamental solution to any force-measuring or weighing problem.

Operating on simple, basic physical principles, Emery systems are maintenance-free. Some units have been in service over 25 years without even recalibration!

RANGES: 0-10,000,000 pounds . . . **ACCURACY:** 1/10 of 1% of range . . . **RESPONSE:** less than 1/2 second . . .

TYPES: self-contained hydraulic, open-flow hydraulic, pneumatic . . . **CELL DEFLECTION:** less than 0.005" . . .

APPLICATIONS: Weighing, Jet Engine Thrust, Brake Testing, Torque Measurements, Strength of Materials, Process Control, Tank Weighing, Platform Scales, Etc.

Since 1872, Emery Force-Measurement Systems have been lowest in initial cost, in operating cost, and require no maintenance.

Write today for information on stock or specially designed systems to solve your force-measuring problems.



THE A. H. EMERY COMPANY, NEW CANAAN 8, CONN.

Please send me

- ☐ Literature on hydraulic weighing
☐ Literature on pneumatic weighing

NAME _____

POSITION _____

Attach to, or write on, your company letterhead.

(Continued from page 150)

CONE AUTOMATIC MACHINE CO., INC., Windsor, Vt.

Screw machine, 8-spindle, complete with coolant system—2—\$44,434

CONSOLIDATED VULTEE AIRCRAFT CORP., Fort Worth, Tex.

Facilities for project MX-1589—\$209,325
Facilities for production B-58 aircraft—\$2,211,000

Facilities for production B-52 aircraft assys—\$40,000

CONTINENTAL AVIATION AND ENGINEERING CORP., Detroit, Mich.

YJ-69-T-17 engines—15 ea.—\$349,320
Engine parts, engine overhauls—25—\$281,861

Special tools and ground handling equipment for R975 engines—\$40,000

CONTINENTAL MOTORS CORP., Muskegon, Mich.

0-470-2 engines—55—\$392,431
Motor vehicle parts—1020—\$40,086

COOPER TIRE AND RUBBER CO., Findlay, Ohio

Tires—30,000—\$616,019

CURTISS-WRIGHT CORP., Caldwell, N. J.

Rotor assy and misc. parts—Various—\$1,567,113

CURTISS-WRIGHT CORP., Wright Aero Div., Wood-Ridge, N. J.

R3350-34 engines—\$6,452,580

CURTISS-WRIGHT CORP., Metals Processing Div., Buffalo, N. Y.

Airframe extrusion—\$500,000

DAVENPORT MACHINE TOOL CO., Rochester, N. Y.

Lathe, automatic, screw machine, 5-spindle—3—\$35,040

DENMAN RUBBER MANUFACTURING CO., Warren, Ohio

Tires, pneumatic—302 ea.—\$12,080

DOUGLAS AIRCRAFT CO., El Segundo, Calif.

Spare parts—Various—\$38,852
Wing assys—Various—\$452,193

DOUGLAS AIRCRAFT CO., El Segundo, Calif.

Ground handling equipment—47 ea.—\$50,654

THE ELECTRIC PRODUCTS CO., Cleveland, Ohio

Charger, battery, single circuit motor generator—132—\$96,780

FAIRBANKS, MORSE & COMPANY, Chicago, Ill.

25 BHP Diesel engine complete with reverse reduction gear—100—\$187,123

FARGO MOTOR CO., Washington, D. C.

Light trucks—140—\$165,963
Passenger vehicles—65 ea.—\$106,291

THE FIRESTONE TIRE & RUBBER CO., Akron, Ohio

Tires and tubes—Various—\$269,657

FORD MOTOR CO., Ford Div., Washington, D. C.

Light trucks—362—\$429,688
Passenger vehicles—143—\$216,603
1 Pick-up truck and 18 4-door sedans—Job—\$25,722
Automobiles—263—\$349,973

THE GARRETT CORP., Air Research Mfg. Co. Div., Los Angeles, Calif.

Gas turbine power units—65—\$1,124,246
Actuator assy. valve pump—242 ea.—\$34,291

(Turn to page 154, please)

"ANOTHER QUALITY PRODUCT MADE FROM INLAND COLD ROLLED SHEETS"



a good finish starts with good steel!

"One of the most important selling features of our cabinets is their durable, beautiful finish," says Mr. R. W. Sponnoltz, Vice President in charge of Product Development, Geneva Modern Kitchens, Geneva, Illinois. "And the steel underneath has a lot to do with the secret of a fine finish. The steel sheets we use must be uniformly flat and free from pits and other surface defects in order to obtain the coverage and adherence that make Geneva cabinet

finishes unexcelled in the industry."

Geneva Modern Kitchens are long-time users of Inland cold rolled sheets because they know they can depend on their being uniform in workability and finishability, shipment after shipment.

If you're experiencing fabricating or finishing problems in the manufacture of your steel products, why not put Inland's reputation for "tailor-made," uniform steel sheets to work for you?



Geneva Laboratory inspector checks adherence of finishes on various types of steel.



INLAND COLD ROLLED SHEETS

INLAND STEEL COMPANY, 38 South Dearborn • Chicago 3, Illinois

Sales Offices: Chicago • Milwaukee • St. Paul • Davenport • St. Louis • Kansas City • Indianapolis • Detroit • New York

AUTOMOTIVE INDUSTRIES, December 15, 1954

(Continued from page 152)

GARY STEEL PRODUCTS CORP., Lynchburg, Va.
Replenishment of tactical vehicles—19—\$34,344

GENERAL ELECTRIC CO., Schenectady, N. Y.
Valve and solenoid assy—603 ea.—\$178,867

GENERAL MOTORS CORP., Allison Div., Dayton, Ohio
Propeller assy, regulator assy, blade assy—754—\$1,587,972
Gear assy master and misc. parts—Various—\$140,871

GENERAL MOTORS CORP., Allison Div., Indianapolis, Ind.

J33-A-37 engine build-up kits—100 ea.—\$112,000
Overhaul J-35 engines—Job—\$1,030,000
Modify and convert J33-A-33/A engines to J33-A-41 engines—31—\$248,000

GENERAL MOTORS CORP., Chevrolet Div., Detroit, Mich.
Light trucks—162—\$206,553
Replenishment of commercial vehicles—15—\$46,243
Automobiles—9 ea.—\$11,140

GENERAL MOTORS CORP., Cleveland Diesel Engine Div., Cleveland, Ohio
Repair parts—20,351—\$473,697

GENERAL MOTORS CORP., Detroit Diesel Engine Div., Detroit, Mich.
Repair parts—50—\$48,959

GENERAL MOTORS CORP., Electro-Motive Div., La Grange, Ill.
Repair parts—21,310—\$128,002

GENERAL MOTORS CORP., Fisher Body Div., Detroit, Mich.
Storage of production facilities—\$141,538

GENERAL MOTORS CORP., Foreign District Div., New York, N. Y.
Automobiles—10 ea.—\$14,793

GENERAL MOTORS CORP., Truck & Coach Div., Pontiac, Mich.
Interim storage of production facilities—\$370,000
Bus—2 ea.—\$48,094

THE GENERAL TIRE & RUBBER CO., Akron, Ohio
Tires and tubes—Various—\$252,544
Wheel assys, nose—600 ea.—\$142,584

GLADDEN PRODUCTS CORP., Glendale, Calif.
Miscellaneous hydraulic spare parts for T-28A aircraft—1127—\$35,687

THE B. F. GOODRICH CO., Akron, Ohio
Maintenance parts used on brake and wheel assys—Various—\$32,725

THE B. F. GOODRICH CO., Washington, D. C.
Tires and tubes—Various—\$275,273

THE GOODYEAR TIRE & RUBBER CO., INC., Akron, Ohio
Tires and tubes—Various—\$285,502
Wheel assy—139 ea.—\$32,936
Wheel assy, brake assy—220—\$52,442
Wheel assy, brake spare parts—\$120,891
Brake lining—33,552 ea.—\$42,309

GRAFLEX, INC., Rochester, N. Y.
Camera sets KS 4A (1) 1686 PHIBP Q—800—\$205,320

GUARDIAN ELECTRIC MANUFACTURING CO., Chicago, Ill.
Switch assy, control stock—6456—\$250,187

GUNDERSON BROS. ENGINEERING CORP., Portland, Ore.
Construction of landing craft mechanized—10—\$191,840

HALLETT MANUFACTURING CO., Inglewood, Calif.
5 KW, Diesel engine generator set—18—\$65,482

HARLEY, DAVIDSON SALES AND SERVICE, Washington, D. C.
Motorcycle—8 ea.—\$12,033

HILLER HELICOPTER CORP., Palo Alto, Calif.
Helicopters, service manuals, handbooks—10—\$552,630

INTERNATIONAL HARVESTER CO., Chicago, Ill.
5 ton, 6x6, trucks—3000—\$36,639,371

INTERNATIONAL HARVESTER CO., Memphis, Tenn.
Truck, tractor—5—\$35,347

INTERNATIONAL HARVESTER CO., Washington, D. C.
Light trucks—6 ea.—\$14,124
Replenishment of commercial vehicles—41—\$63,865
Tank trucks—2 ea.—\$18,705

KINGSBURY MACHINE WORK, INC., Philadelphia, Pa.
Repair parts—2425—\$73,716

LA CROSSE TRAILER CORP., La Crosse, Wis.
Replenishment of tactical vehicles—99—\$345,124

(Turn to page 156, please)

Burton SPRINGS

SERVE THE
NATION



The greatest proving ground for Burton Springs is in the field where they are used under the most demanding circumstances, and under all conditions of terrain, weather, and load. Back from the main highways, where the average citizen never sees them, Burton Springs are helping to clear land, haul timber, level roads and do the heaviest kind of heavy duty work.

Burton's engineering experience and skill pay off under such conditions. Manufacturers, like the White Motor Company, have come to rely upon the performance of Burton Springs. They know Burton can be counted upon every time, for Burton maintains a high standard of quality.

For your own particular spring problem, why not consult with our engineers. They are always ready to assist you.

Why not contact Burton today.

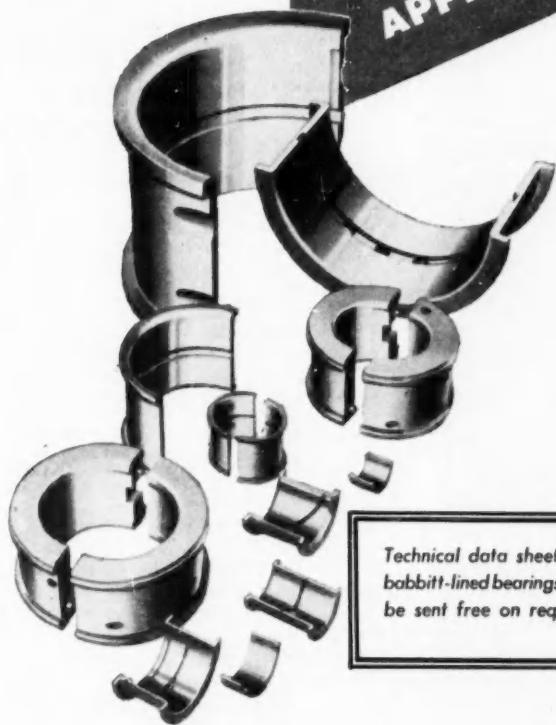
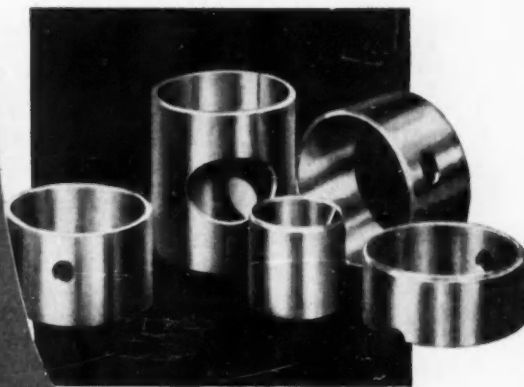
Put the Burden on Burt Basco

Burton

AUTO SPRING CORP.

40th ST. at WESTERN AVE.
Chicago 32, Illinois

JOHNSON
Babbitt Lined
SLEEVE BEARINGS
FAVORED FOR
many
APPLICATIONS



Technical data sheets on
babbitt-lined bearings will
be sent free on request.

BECAUSE of the many inherent properties of babbitt as a bearing material, it fits into numerous applications. Babbitt provides a natural low coefficient of friction, easy conformability, high imbeddability, good wettability with lubricants, and high corrosion resistance to most oils. Coupled with these features, bronze or steel backing gives the necessary strength to the bearing. The alloy of lead-base or tin-base babbitt and the backing metal can be selected to meet operating conditions.

Through long years of research and experience, Johnson Bronze has developed a method of combining babbitt and either bronze or steel into a durable, lasting bond. This, together with the knowledge of the relative thicknesses of babbitt and backing for utmost efficiency and high quality workmanship, assure you of long, satisfactory service from Johnson Babbitt-Lined Bearings. Our engineers will gladly consult with you on proposed applications. Write for an appointment.

JOHNSON BRONZE COMPANY,
625 South Mill St., New Castle, Pa.

Sleeve Bearing Headquarters Since 1901

JOHNSON B BEARINGS
Sleeve-Type

SHEET BRONZE
Plain or graphited

BRONZE-ON-STEEL
Copper Alloy

LEAD ALLOY
Self-lubricating

CAST BRONZE
Plain or graphited

ALUMINUM ALLOY

For A BETTER PRODUCT...

... USE FAIRFIELD GEARS

★ If GEARS are a vital part of the product you make, there is no finer recommendation for the **QUALITY** of your product than to be able to say it is equipped with "FAIRFIELD GEARS."

Long producers of the gears needed in high grade trucks and tractors, Fairfield now brings the same standards for **GEAR PERFORMANCE** to a wide variety of products: Agricultural Implements... Power Shovels... Machine Tools... Diesel Locomotives... Road Graders... Lift Trucks... Road Rollers... Pump Drives... Winches... Military Vehicles... and a host of others.

Fairfield's facilities are unexcelled. Here "under one roof" in a new and ultra modern plant designed especially for the purpose, Fairfield has everything needed for producing all kinds of gears: spur... herringbone... spiral bevel... ground tooth spiral bevel... straight bevel... coniflex bevel... hypoid... zerol... worms and worm gears... splined shafts... differentials. Get acquainted with Fairfield's engineering and production facilities. Your inquiry will receive prompt attention. **FAIRFIELD MANUFACTURING COMPANY, 2303 South Concord Road, Lafayette, Indiana.**

Fine Gears Made to Order

FAIRFIELD



LAFAYETTE

INDIANA



HEAVY DUTY TRUCKS



AGRICULTURAL IMPLEMENTS



CONSTRUCTION MACHINERY



HEAVY DUTY ENGINES



TRACTORS



SPECIAL PURPOSE VEHICLES

(Continued from page 154)

LEACH CORP., Los Angeles, Calif.
Motor generator—82 ea.—\$374,815

LEAR, INC., Grand Rapids, Michigan
MB-2 autopilot system—258 ea.—\$9,001,682

THE LELAND ELECTRIC CO., Div. American Machine and Foundry Co., Dayton, Ohio
Inverters—663—\$261,505

LOCKHEED AIRCRAFT CORP., Burbank, Calif.
F-104 aircraft—\$11,000,000

LOCKHEED AIRCRAFT CORP., Georgia Div., Marietta, Ga.
Drag angle modification of B-47 aircraft—40 acct—\$258,140

MACK MANUFACTURING CORP., Allentown, Pa.
Truck, tractor, M52—1630—\$16,860,277

MARION POWER SHOVEL CO., Marion, Ohio
Power shovel, crawler type—I type—\$31,627

THE GLENN MARTIN CO., Baltimore, Md.
B-61A pilotless aircraft—57—\$5,134,511

MINNEAPOLIS-HONEYWELL REGULATOR CO., Minneapolis, Minn.
Power units for various aircraft—215 ea.—\$35,153

THE MOHAWK RUBBER CO., Akron, Ohio
Tires—20,000—\$270,617

NILES-BEMENT-POND CO., Pratt & Whitney Div., W. Hartford, Conn.
Vertical shaper, model P&W 12-in. model—2—\$34,814

NORTH AMERICAN AVIATION, INC., Columbus, Ohio
Aircraft spares, special tools, etc.—\$60,500

NORTH AMERICAN AVIATION, Los Angeles, Calif.
F-86H mobile tr unit—I ea.—\$249,002

THE OILGEAR COMPANY, Milwaukee, Wis.
Parts, repair, for automotive vehicles—254—\$29,317

THE PACIFIC TIRE AND RUBBER CO., Oakland, Calif.
Tires—25,000—\$633,750

PACKARD MOTOR CO., Detroit, Mich.
Repair parts for Diesel engines—32,702—\$1,265,167

PINES ENGINEERING CO., Aurora, Ill.
Bending machines—61 ea.—\$433,649

PIONEER AIR COMPRESSOR CO., New York, N. Y.
Compressor—696 ea.—\$509,725

RADIOPLANE CO., Van Nuys, Calif.
Model OQ-19 targets—7372—\$19,441

REO MOTOS, INC., Washington, D. C.
Truck, cab and chassis—28 ea.—\$181,907

ROCKFORD MACHINE TOOL CO., Rockford, Ill.
Vertical hydraulic slotter, model 36 in., less electric equipment—6—\$35,830

THE FRANK G. SCHENUIT RUBBER CO., Baltimore, Md.
Tires and tubes—Various—\$238,703

SCIACKY BRO., Chicago, Ill.
Welding machine—34 ea.—\$243,100

STUDEBAKER - PACKARD CORP., South Bend, Ind.
Passenger vehicles—64 ea.—\$101,401
(Turn to page 158, please)

Model 145 Dart Truck equipped with Allison TORQMATIC DRIVE being loaded at Sunnyhill Coal Company's New Lexington, Ohio mine. Truck is one of 10 operated by Sunnyhill.



10 trucks replace 30 - cut costs 62%

WHEN 10 50-ton trucks equipped with Allison TORQMATIC DRIVES replaced 30 mechanical-drive 20- and 30-ton trucks at Sunnyhill Coal Company's New Lexington mine:

Operating costs dropped 18.6¢ per ton, Maintenance costs were cut 13.1¢ per ton,

And the TORQMATIC-equipped trucks now haul 32.6 more tons per truck hour.

But lower costs are only part of the story.

On-the-job accidents have dropped sharply. Drivers stay fresher, more alert because they now have no clutch pedal to push—quick-shift at full throttle with finger-tip hydraulic control—have only 3 shifts instead of 7 or 10.

Wet weather worries have almost disappeared—road maintenance costs are lower. Smooth power transmission by the Allison TORQMATIC DRIVES lets trucks drive through mud and muck—conditions that often shut down the mine before TORQMATIC-equipped units came on the job.

Big reason for lower operating and maintenance costs is shock-free power transmission by the *matched* TORQMATIC Converter-Transmission teams. The Converter absorbs shock loads instead of transmitting them along the drive line—protects engine, differential, drive shaft and transmission from damage.

There's an Allison TORQMATIC DRIVE for your 40- to 400-horsepower gasoline and Diesel equipment. New low-

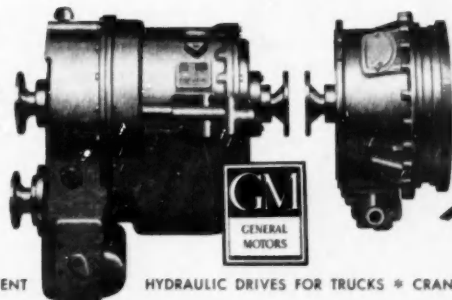
cost 40-150 h.p. TORQMATIC Converters easily fit present equipment, are completely self-contained for simple installation. Get full details about Allison TORQMATIC DRIVES from your equipment manufacturer or dealer or write: Allison Division of General Motors Box 394A, Indianapolis 6, Indiana

ALLISON TORQMATIC DRIVES

Unbeatable Team for Maximum
Operating Economy

- **Quick-Shifts** at full throttle with finger-tip hydraulic control
- **Holds** power to load at all times—no clutch pedal to push—no gearshift guess
- **Reduces** maintenance costs by absorbing shock—eliminates engine lugging—prolongs equipment life
- **First** torque converter-transmission team designed to work as a *unit* and built by one manufacturer
- **Cuts** driver training costs

FIRST MATCHED
UNITS BUILT BY
ONE MANUFACTURER



COMPACT, EFFICIENT

HYDRAULIC DRIVES FOR TRUCKS * CRANES * TRACTORS * SCRAPERS * SHOVELS * DRILLING RIGS

Allison
TORQMATIC DRIVES

(Continued from page 156)

TEST INSTITUTE CORP., Cleveland, Ohio
Design data of hydraulic system components, tests—\$91,980

UNITED AIRCRAFT CORP., Hamilton
Standard Div., Windsor Locks, Conn.
Air turbine starters—537—\$1,060,300

UNITED STATES RUBBER CO., Detroit, Mich.
Tires and tubes—Various—\$422,526

VICKERS, INC., Detroit, Mich.
Pump assy—395—\$336,483
Pumps and motors—Various—\$297,604

WARNER LEWIS CO., Div. Fram Corp., Tulsa, Okla.
Filter, aviation fuel (548-803)—8—\$97,695

THE WEATHERHEAD CO., Cleveland, Ohio
Motor vehicle parts—13,536—\$173,136

WESTINGHOUSE ELECTRIC CORP., Baltimore, Md.
Study of air vehicle electrical systems and techniques—Job—\$100,000

WESTON HYDRAULICS, LTD., North Hollywood, Calif.
Miscellaneous spare parts for B-36 aircraft—4809—\$36,219

WILLYS MOTORS, INC., Toledo, Ohio
Light trucks and parts—22 vehicles—\$38,544
Light trucks—27,264
Light trucks—1042—\$1,682,179

Chevrolet Developments

(Continued from page 51)

core. Basic components of the refrigeration system include in addition to the cooling coils, a refrigerant, compressor, electromagnetic clutch, condenser, liquid receiver and expansion valve.

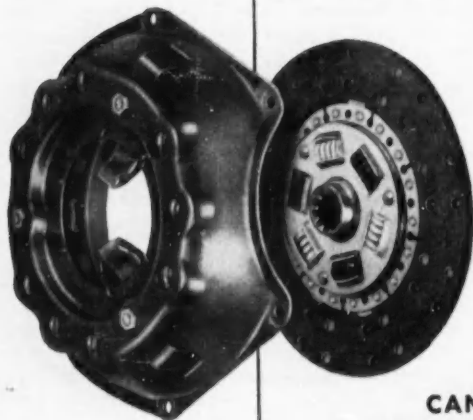
When cooling is desired, a door within the distributor housing may be positioned to direct cooled air through flexible ducts to two adjustable outlet nozzles mounted in spherical sockets at each end of the instrument panel. These outlets may be positioned to direct air in accordance with individual preferences, along the inside roof line, downward, or directly at the passengers.

One edge of the cool air by-pass door in the main distributor is unsealed. A slight gap is designed to permit passage of sufficient air through the heater distributor to relieve the front compartment floor area of the heating effect of the engine compartment.

Engineered by

BORG & BECK®

means . . . **CLUTCHES** built to the exacting standards which have made the name **BORG & BECK** famous for 36 years!



YOU
CAN DEPEND ON
BORG & BECK®
CLUTCHES... FOR THAT VITAL
SPOT WHERE POWER TAKES
HOLD OF THE LOAD

Reg. U. S. Pat. Off.



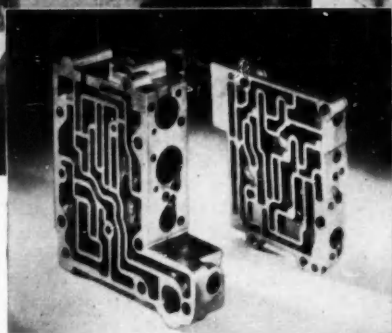
BORG & BECK DIVISION

Borg-Warner Corporation
CHICAGO 38, ILLINOIS

BOOKS...

DUTY LUBRICATING OILS, published by Internal Combustion Engine Institute, 261 N. Wells St., Chicago 6, Ill. Price, \$0.20. This booklet lists the trade-names of over 1200 lubricating oils offered by 366 oil companies as meeting certain requirements for heavy-duty industrial engines. In the booklet the oils are divided into three types: (A) Those represented by the oil supplier as meeting the requirements of U. S. Military Specification MIL-0-2104 and/or the British Defense specifications DEF/2101, wherein the Diesel engine test uses a fuel of 0.35% minimum sulfur content; (B) those represented by the oil supplier as meeting the requirements of U. S. Military Specification MIL-0-2104, wherein the Diesel engine test is modified by using a fuel of 0.95 per cent to 1.05 per cent sulfur content, and (C) the oils represented by the supplier as meeting the more severe requirements of a superior lubricant.

TENTATIVE SPECIFICATIONS FOR ALUMINUM AND ALUMINUM-ALLOY WELDING RODS, published by American Welding Society, 33 West 39th St., New York 18, N. Y. Price, \$0.25. For the first time, filler metal for inert-gas metal-arc welding aluminum has been standardized by the new specifications, issued jointly by the AWS and the ASTM (AWS Designation A5.10; ASTM Designation B285). These specifications include aluminum and aluminum-alloy welding rods and bare electrodes. The rods are for use with the gas, carbon-arc, atomic-hydrogen and inert-gas metal-arc (non-consumable electrode) welding processes. The bare electrodes are used with the inert-gas metal-arc (consumable electrode) welding process. Twenty-two classifications of filler metal are established by these specifications. This includes all the commonly used aluminum and aluminum-alloy filler metals.



Holes on extremely close centers vary in diameter from $\frac{1}{16}$ " to $\frac{13}{16}$ ". The valve body has 33; the cover, 18.



"—BUT OUR PRODUCTION RUN IS LIMITED."

"SO WAS THE RUN ON THIS AUTOMATIC TRANSMISSION PART, BUT". . .



HERE'S HOW ZAGAR TOOLING SAVED MONEY HAND OVER FIST

This aluminum die casting is processed in its entirety by Zagar planning, except for milling two faces. Two lines of Zagar standardized self-clamping drill jigs ream, tap and drill both valve body and cover. With 24 heads and 24 fixtures, Zagar performs work on 51 holes on

close centers. Step tools take care of reaming and burnishing. The fixtures were designed to compensate for slight inaccuracies in the die casting. Thus has Zagar engineering solved an acute problem of limited production without the purchase of costly special machines.



Ask on your letterhead for Bulletin "U-12."

ZAGAR TOOL, INC.

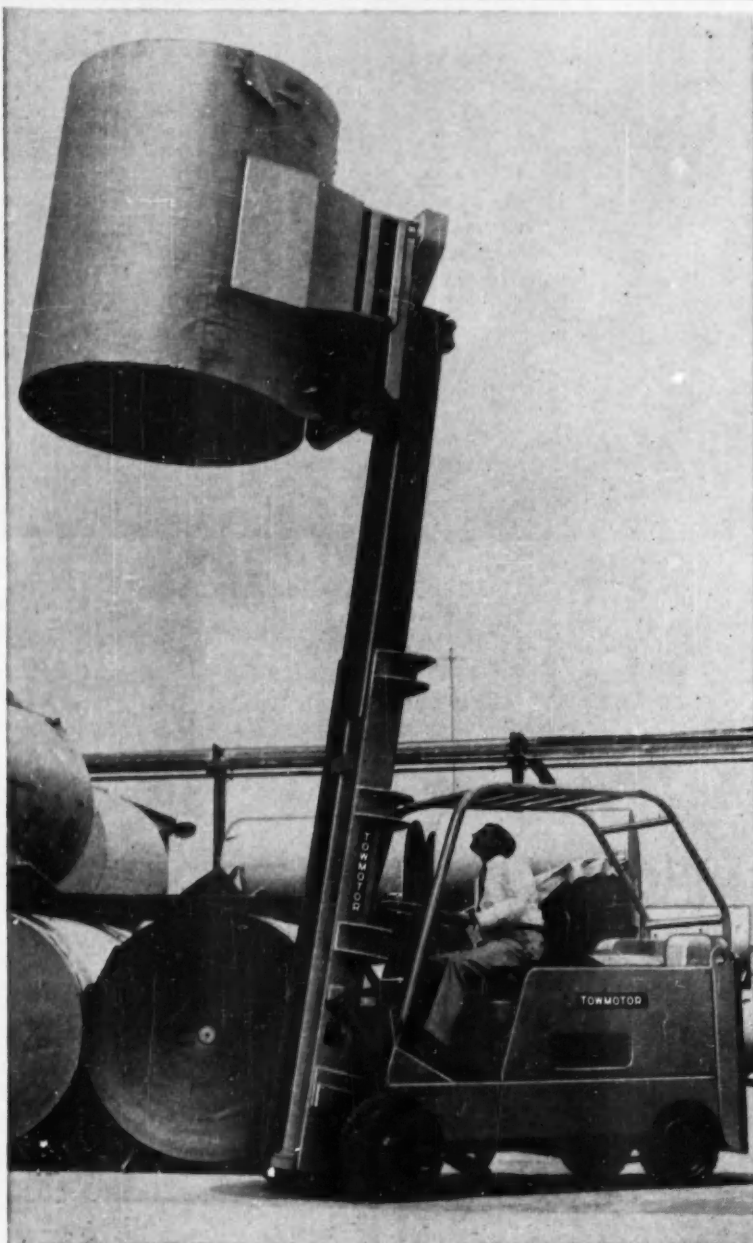
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and SPECIAL MACHINERY

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FORK LIFT TRUCKS**

Towmotor Upending Roll Clamp lifts, turns and high-stacks rolls mechanically. Cuts handling time and costs up to 80%.

Towmotorize your handling problems

On certain jobs, a job-planned Towmotor performs more efficiently and more economically than fork-equipped lift trucks. Write for Certified Job Studies giving facts on materials handling savings in *your industry*.

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FOR FAST ACTION—See your nearby Towmotor Representative. He's a materials handling specialist. His factory training will show you the quickest way to attain maximum handling efficiency at minimum cost.

Brazilian Trucks

(Continued from page 70)

Commission and approved by the President of the Republic on October 30, 1952 (tires, batteries and upholstery) as long as the minimum percentage of the weight, as outlined above, is maintained.

Importation of the vehicle spare parts (finished products and half-manufactured supplements of domestic production) can be made as long as they adhere to the aforementioned conditions, through any company (independent of the presentation of the programs) in the category in which were classified the trucks of that type with the omissions.

No special concession of foreign exchange will be made to any company to restrict its importations up to the above specified limit. Enterprises which have a project for the manufacturing of a "national" truck to be carried out within the period of three years, will be given the highest priority for the importation of the necessary parts in order to deliver the vehicle, produced in Brazil, as soon as its proposals have been approved by the government up to the end of the year 1954 and as soon as its equipment for the manufacturing of the engine are installed.

The importations of the above mentioned items must be proportionate to the capacity of the plant. As soon as this order goes into effect, the vehicle importers who do not wish to follow the half-manufactured plan, as foreseen in the above mentioned arrangement, can still import the trucks of this type through the least favorable import category.

The president of the Sub-Commission of Jeeps, Tractors, Trucks and Automobiles, gave the following explanation as to why the industrial plan was set up in this way:

He reasoned that the percentages of domestic manufacturing, as foreseen in the industrial plan for the various years, was not fixed arbitrarily, but was the result of a careful analysis of the larger items of a vehicle which already are produced in Brazil, and those which are already planned for future production with the best perspective as to their practicability. It should be pointed out that in the same group are included trucks of various types and even of different economic interests, in view of the fact that the majority of manufacturers use the same engine for different types. As the engine is that part which is of

(Turn to page 163, please)

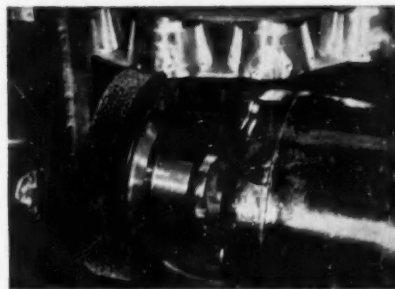


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AN Osborn Brushing Specialist knows where power brushing fits into the overall production picture. In making an **Osborn Brushing Analysis**, he studies all cleaning, finishing and burr removal operations. Then, he analyzes these operations and submits a written report that tells where power brushing could speed production or improve quality.

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4 TIMES FASTER. Here, "push-button" brushing with Osborn Master Wheels removes feather burrs at a rate of 1400 parts an hour. By former hand method, output was 350 per hour. An **OBA** can help speed your production, too.



Osborn Brushes

BRUSHING METHODS • POWER, PAINT AND MAINTENANCE BRUSHES • BRUSHING MACHINES • FOUNDRY MOLDING MACHINES

AUTOMOTIVE INDUSTRIES, December 15, 1954

161

THIS PUMP OPENED NEW DIESEL MARKETS...

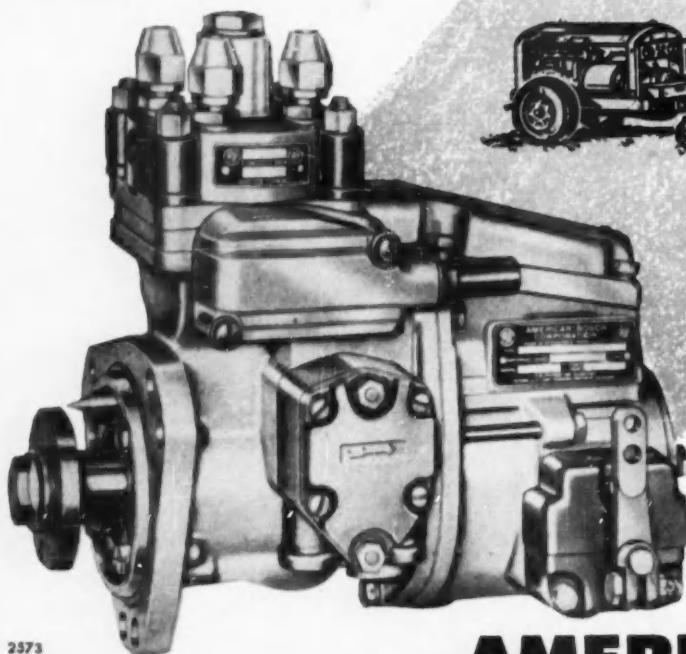
THE AMERICAN BOSCH "PSB"

American Bosch's development of the PSB single-plunger pump made it possible for engine manufacturers to produce the smaller, lower-cost Diesels which have opened up new markets for Diesel power. You see it serving everywhere — on efficient Diesels that power farm tractors, compressors, generating sets, boats and trucks in ever-increasing numbers.

Today, more Diesel engine manufacturers are using the American Bosch PSB as standard equipment than ever before. It's easy to see why — for the PSB gives both the engine manufacturer and the user a simplified, compact, lower-cost pump with a *proven* record of outstanding performance and dependability *plus* ease of servicing and low maintenance expense.

The PSB is a product of American Bosch's continuing program of research and development. It stands as a significant contribution to the progress of the Diesel.

AMERICAN BOSCH, Springfield 7, Mass.



2573



AMERICAN BOSCH

Brazilian Trucks

(Continued from page 160)

the greatest importance in a truck, it is reckoned that once its production has been achieved, it should take advantage of the greatest commercial production scale possible.

Even admitting that the manufacturers should make, initially, the least elaborate parts, an analysis of the weight of a truck was made which resulted in the conclusion that about 65 per cent of the weight of a truck represents (1) parts of easy manufacture and (2) parts which are already made in Brazil to a great extent. Parts in the first group would include, for instance, wheels, chassis frames, cabs, etc., and within the second group such items as tires, tubes, batteries, spring leaves, windows, upholstery, brake drums, etc. The carrying out in Brazil of these 65 per cent of the weight items would neither involve investments of any great extent nor greater technical know-how.

In the case of medium type trucks, items of simple manufacture and their percentages in relation to the total weight of the vehicle would appear as follows:

Components	Percentage of Total Weight	Item Accumulation
Tires	9.55	.....
Springs	8.56	18.11
Batteries	1.00	19.11
Cabs	12.50	31.59
Brake drum and hubs	8.14	39.73
Fenders	3.23	42.96
Brake pedals	0.66	43.62
Running boards, fenders	4.37	48.00
Wheels (7)	9.81	58.53
Chassis frame	10.77	69.30

In order to surpass the limit of 65 per cent of the weight of a truck, the only possibility lies in the national production of the engine, or, alternatively, in the complete rear axle. In this case, greater capital is necessary as well as the application of greater technical knowledge.

Quite apart from the above outlined project of the industrial plan and comments made by the president of the sub-commission, it is obvious that although in reality the plan is already followed right now, a considerable number of items still have to be imported through the Brazilian stock exchanges' auction system. These items, according to their essentiality, are classified into five categories with the bids starting at a minimum "agio" fixed for each category by the Superintendency of Money and Credit (SUMOC). These minimum "agios," at present are as follows: First category Cr. \$15, second category Cr. \$18, third category Cr. \$30 and fifth cate-

gory Cr. \$75 to which must be added the official exchange rate of Cr. \$18.82 per dollar.

Although in the past, items of the automotive, aviation and other industries have been shifted from one category to another, the latest reclassification of certain automotive and aviation goods placed them in more favorable categories, so as to make their imports less costly. Notwithstanding, Brazil's highly critical financial situation and the ever increasing dollar shortage have resulted, during the first 10 days of November, in record high auction bids which brought even

AUTOMOTIVE INDUSTRIES . . .

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first category goods to an average of Cr. \$65 to the dollar (to which should be added the official exchange rate of Cr. \$18.82) and third category items to Cr. \$65 plus Cr. \$18.82 to the dollar.

Toss the Problem to Formed Tubes



Formed Tubes Engineers, backed with modern plant facilities and 27 years of experience serving the automotive and aviation fields, can often come up

with ways that a component part can be made cheaper and lighter; yet at the same time give it even greater dependability.

Quality is controlled and cost kept low because we make our own tubing to the size and gauge you require. Because we are not dependent on an outside steel tube supply, you can bank on our delivery promises.

Steel, copper, brass and aluminum tubing are fabricated to your specifications in $\frac{3}{8}$ " O.D. to 6" O.D., in 20 ga. to 11 ga. metal. Overnight truck delivery to Michigan, Northern Ohio, Indiana and Illinois areas. Phone or write for full information on Formed Tubes.

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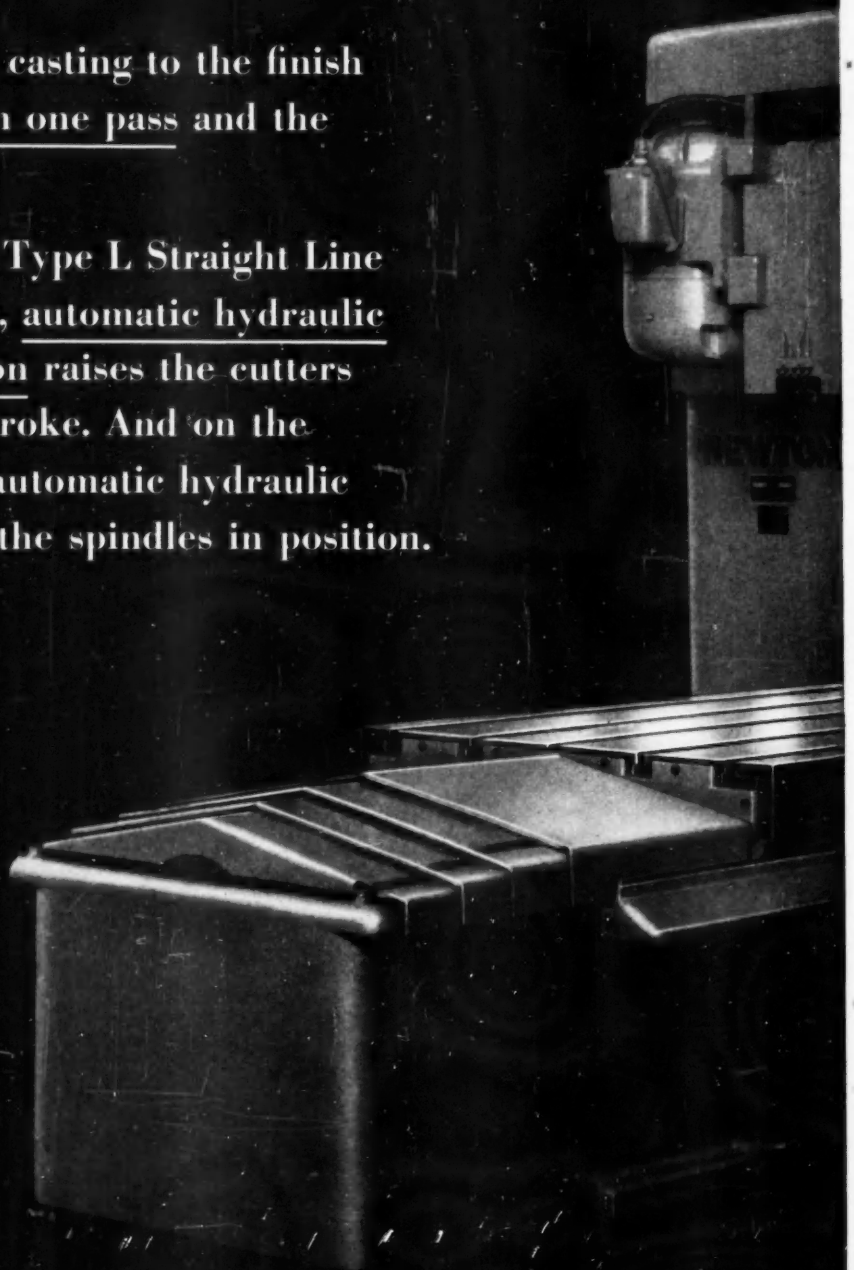
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One Pass . . . and

From the rough casting to the finish milled surface in one pass and the job is done!

On this Newton Type L Straight Line Milling Machine, automatic hydraulic spindle retraction raises the cutters on the return stroke. And on the milling stroke, automatic hydraulic clamping locks the spindles in position.

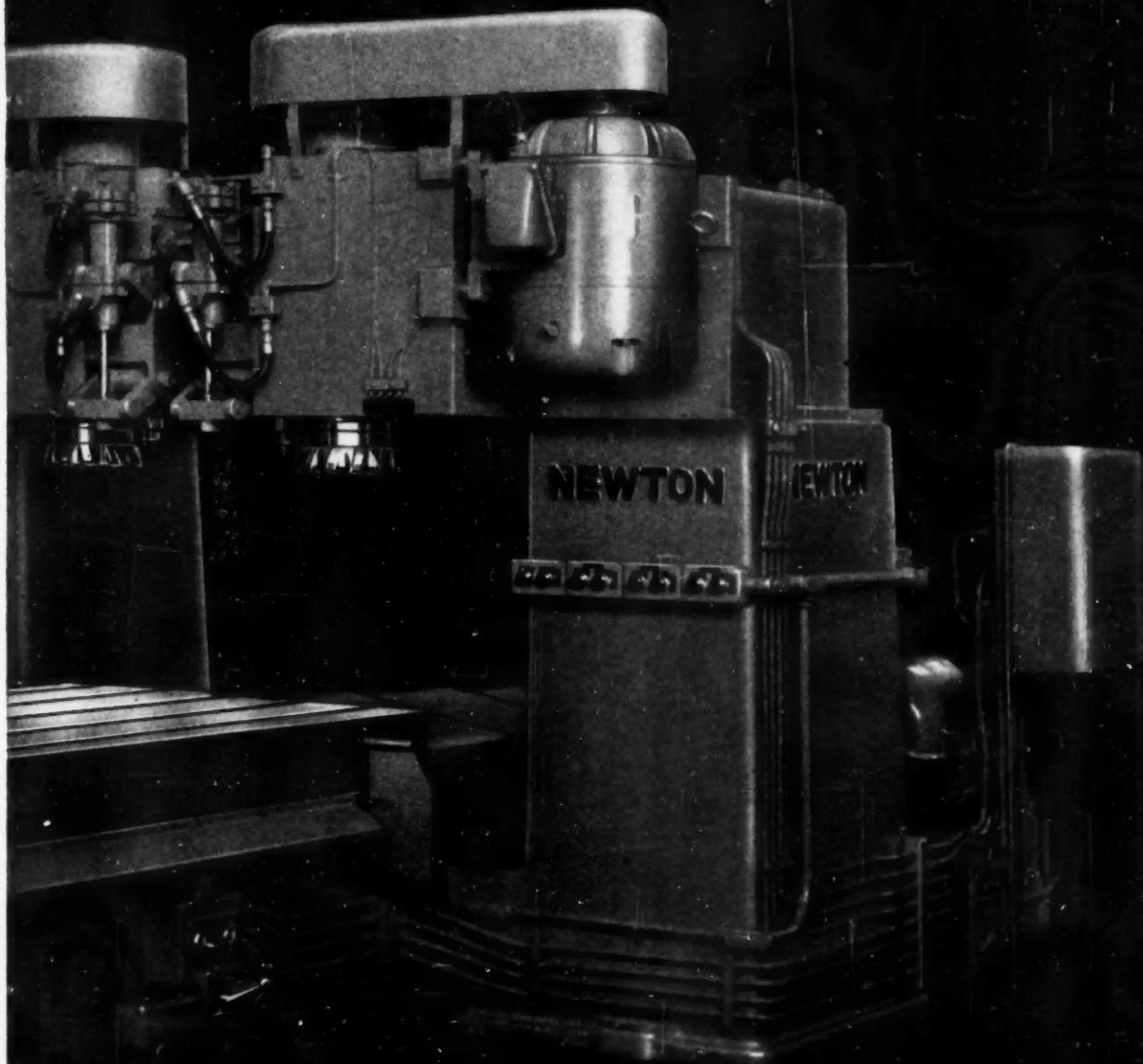
Newton Type L Straight Line Milling Machine with 20 H.P. heads for one-pass milling of aluminum crank cases.



CONSOLIDATED MACHINE TOOL

Wholly owned subsidiary of Farrel-

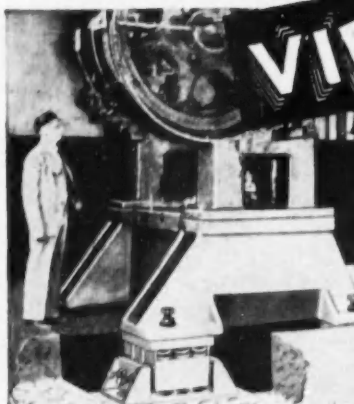
the Job is Done!



CORPORATION, ROCHESTER, N. Y.

Birmingham Company, Incorporated

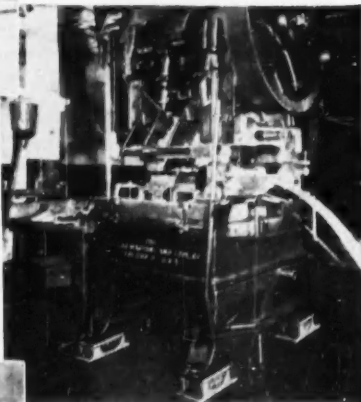
STOP VIBRATION



A TOUGH ↑ PROBLEM

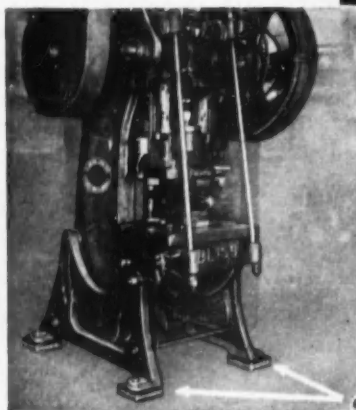
solved by specially designed Korfund Steel Spring Vibro-Isolators. Shock from this 100,000-400 ton capacity press was cracking building walls. Four specially designed 25,000 lb capacity Korfund Steel Spring Vibro-Isolators, themselves weighing 600 lb each, were installed under the press. Building damage stopped and heavy production schedules were maintained. Yet, the price of the special Korfund Isolators was less than 3% of the press cost.

with KORFUND VIBRATION CONTROL



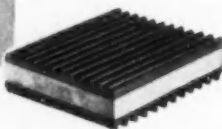
AN AVERAGE ↑ PROBLEM

—typical of those solved every day by Standard Korfund Steel Spring Vibro-Isolators. Vibration and noise from this double crank press, which could be felt and heard throughout the building, were stopped by Standard Korfund Steel Spring Vibro-Isolators. More and more manufacturers are discovering how Korfund Vibro-Isolators permit press installation without reinforcement of floors, permit press installation anywhere (even near precision equipment) for better plant layout, increase press speed and production, improve quality.



A SIMPLE ↑ PROBLEM

solved inexpensively and effectively by Korfund Elasto-Rib Pads. In this case, Elasto-Rib Pads installed under each of the legs of this press stopped transmission of vibration and noise. For the less critical installation, Korfund Elasto-Rib Pads provide low-cost, effective vibration and noise control, and eliminate bolting to the floor.



PUNCH PRESSES are notorious for the amount of vibration and noise they transmit—yet in the three cases illustrated, Korfund Vibration Control units successfully

solved the problem. In our files are scores of case histories describing equally satisfactory installations on many other types of machinery.

A selector chart is available giving recommendations for various vibration control problems. Write for your copy of Bulletin No. 13, or see our catalog in Sweet's Files.

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Plant Maintenance
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Chicago
January 24-27



THE KORFUND CO., INC.

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In Canada: 510 Canal Bank, Ville St. Pierre, Montreal

Studebaker-Packard Corp.

(Continued from page 69)

January, are a new V-8 engine with the highest horsepower in the industry, new improved Ultramatic automatic transmission, new styling with wrap around windshield, and front and rear torsion bar suspension with automatic load compensator. Torsion bar suspension will be regular equipment on Packard cars and higher-priced Clippers, and optional on other Clippers.

Organizational Structure

Keenly conscious of the advantages which decentralization affords, Studebaker-Packard Corp. will aim on as much subdivision in both operations and managerial authority as seems feasible. In this connection, Mr. Nance indicated that a new management team would be built composed of roughly three executive classes. Approximately one-third of the group would be composed of members of the original management of the corporation, a second third of executives drawn from competitive companies, and the remaining third from outside the automobile industry.

On the subject of dealer organization, Mr. Nance reported that Packard currently has 1700 dealers and expects to increase this figure to 2000 by January. Studebaker will retain its complement of 2500 dealerships, 500 of which are dual in nature, to start 1955. Thus, the corporation will have a total of 4000 sales and service outlets.

It is also expected that one of the first moves of the recently formed Export Div., which links the overseas operations of Packard and Studebaker under one management in South Bend, Ind., will be to give both lines of cars to some of the corporation's foreign dealerships. Studebaker now has 1500 outlets abroad, while Packard has 175.

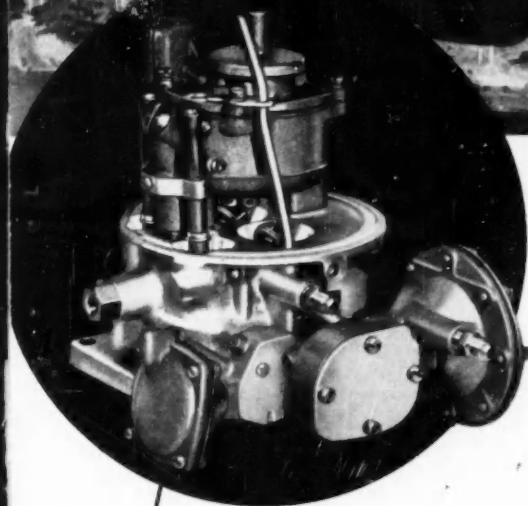
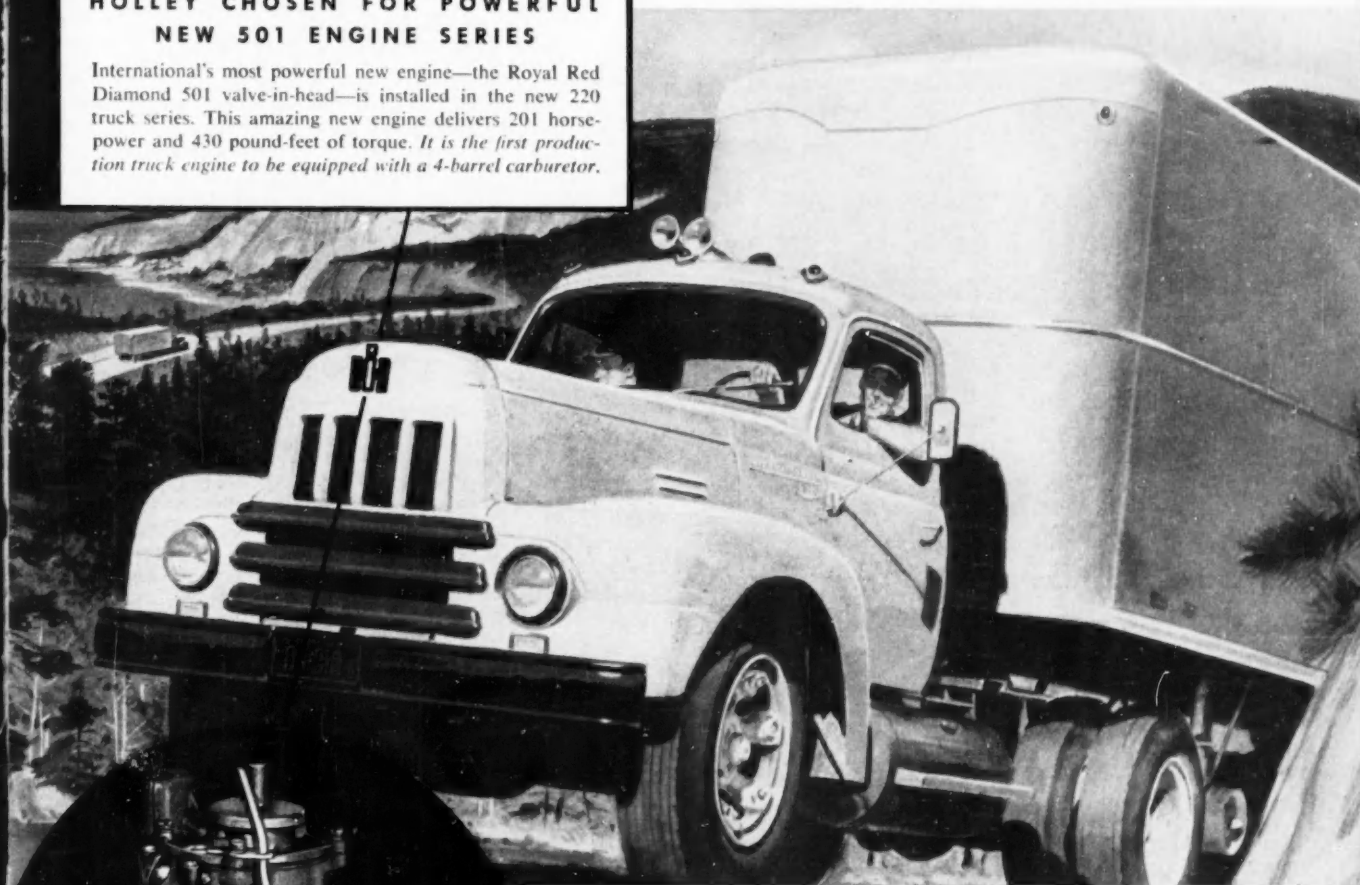
Although Packard has no overseas assembly plants, it has three distributor-owned plants in Belgium, South Africa, and Australia. Studebaker has 10 such plants, in addition to assembly plants in Canada and Mexico.

Since, as Mr. Nance pointed out, Studebaker-Packard Corp. already has received several development contracts on defense projects and is negotiating for important manufacturing assignments for the Government, it is conceivable that another new division will be set up to handle this work. The corporation was said to have gained considerable encourage-

INTERNATIONAL *Pioneers the move* TO 4-BARREL CARBURETION!

HOLLEY CHOSEN FOR POWERFUL NEW 501 ENGINE SERIES

International's most powerful new engine—the Royal Red Diamond 501 valve-in-head—is installed in the new 220 truck series. This amazing new engine delivers 201 horsepower and 430 pound-feet of torque. *It is the first production truck engine to be equipped with a 4-barrel carburetor.*



If you're wondering how to do a job of fuel metering better and more efficiently, call Holley's Carburetor Engineers. Let them listen, test, recommend and design.

This Holley-developed 4-barrel carburetor increases both engine output and power range. It is the first 4-barrel carburetor with a built-in governor; first with vacuum controlled secondary barrels.

The secondary barrels remain closed at low engine speeds, allowing the engine to maintain satisfactory velocities and distribution. Then, as engine speed increases to a point where additional breathing capacity is needed, the vacuum controlled secondary barrels open automatically.

Working closely with International engineers, Holley designed and developed this advanced carburetor-governor combination. It is original equipment on all tractors and trucks in International's new 220 series.

For Holley carburetor parts and service for International trucks, see your local International Harvester outlet.

HOLLEY
Carburetor Co.

VAN DYKE, MICHIGAN

Working with Automotive Engineers to Increase Standards of Performance and Economy for More than Half a Century.

ment on this score from Secretary of Defense Wilson's recent statement that defense spending will continue at a \$35 billion a year rate.

Pricing Policies

Studebaker has fallen in line with the Big Three car manufacturers in adjusting freight rates. Packard is expected to follow suit later in the pricing of its new models.

Although the new freight equalization plan put into effect by Studebaker raises the prices of most 1955 cars, the new models will still sell under their 1954 counterparts, due

to price cuts Studebaker announced when it first introduced the 1955 models.

The adjustment in freight rates results in increases on factory delivery retail prices ranging from \$14 to \$92 over the prices announced in October. On the average, however, the prices are still about \$100 under the 1954 models because of the sizeable reductions made earlier.

While the latest price increases cover 23 of the company's car models, one model now has an even lower price tag. Under the new freight formula, the Champion Deluxe Sta-

tion Wagon carries a factory delivery retail price of \$2140, compared with \$2150, previously. Maximum freight charges under the new program are \$140 on the Champion series and \$159 on the Commander and President.

Business Pulse

(Continued from page 96)

than seasonal, is explained largely, if not entirely, by the sharp increase which has occurred in automobile production in recent weeks. Since there is some question (despite exceedingly low inventories) whether current automobile assemblies are realistically geared to potential demand, there is some question also as to the significance of the more-than-seasonal rise in business as a whole.

Car sales are normally slow in the winter months, and it is therefore to be expected that a substantial portion of output during the next few months will be added to inventories in anticipation of spring and summer sales. If those sales prove to be below manufacturers' present expectations, causing output schedules to be revised downward, then the help which general business is currently getting from high automobile production will be shown to have been of no particular long-term significance.

In considering this point, some observers are of the opinion that manufacturers' expectations are somewhat on the rosy side. There are reports that General Motors expects to get 55 per cent of the total car sales next year. Ford is said to be aiming at 40 per cent, Chrysler at 20 per cent, and the so-called independents at 10 per cent. Adding these projections together, one arrives at a total of 125 per cent. This obvious impossibility suggests that, if the above figures form the basis for current and prospective rates of output, some producers at least are destined to be disappointed.

The scattered reports which are available at present on sales of 1955 models suggest that volume has been good, and manufacturers are represented as being well satisfied by customer response to date. It is difficult, however, to know how much significance to attach to this initial enthusiasm, particularly in view of the fact that a good many car purchases were probably deferred during the weeks prior to the introduction of the new models. Uncertainty regarding the basic sales trend will undoubtedly

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All types and sizes of screws (hex head, Phillips, slotted, socket), bolts, nuts, washers, rivets, keys and pins



- Over 9000 items in stock means immediate delivery from one source
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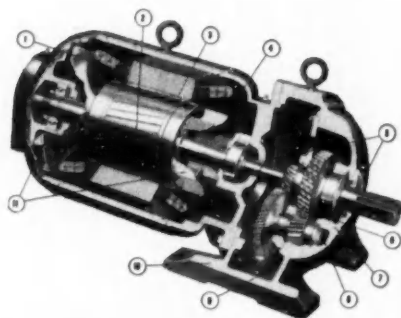
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FASTENER MANUAL P3

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The power you need at the speed you need it . . .

HOWELL GEAR MOTORS



11 reasons why Howell Gear Motors last longer, serve you better

1. High-quality insulation
2. Copper-clad rotor
3. Expert craftsmanship
4. High-quality coil varnish
5. Leakproof oil seals
6. Duti-Rated Lifetime Gearing
7. Unit case construction with integral bearing housings
8. Corner-mounted offset shaft
9. Large oil reservoir
10. Heavy, cast-iron construction
11. Superior cooling

New dependability, greater starting torque and top efficiency, with output speeds as low as 7.5 rpm. are now available in Howell Gear Motors.

This compact, single-unit motor may well be the answer to your gear reduction problems. Combining the finest in heavy duty industrial gearing with the best in motoring, Howell Gear Motors reduce drive failures and production downtime.

Howell Gear Motors use duti-rated, lifetime gearing, with file-hard tooth surfaces and tough, resilient cores. They are available in all types of enclosures, from 7.5 to 780 rpm. with a capacity range from 1 to 150 hp., in all three AGMA service classifications.

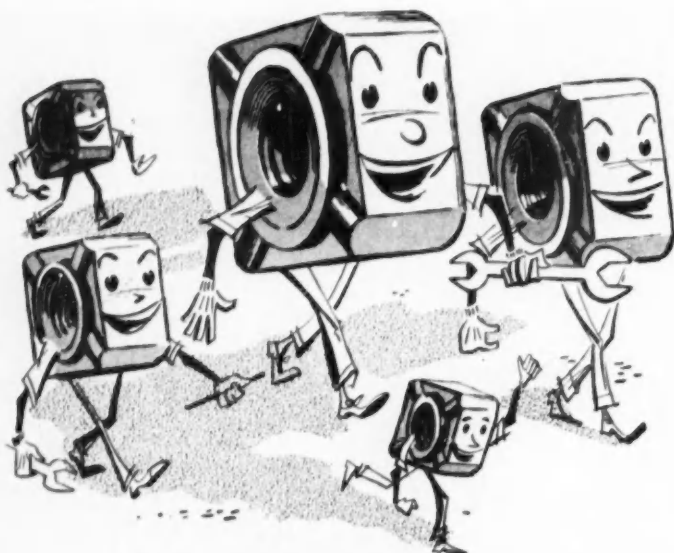
For full information on Howell Gear Motors, contact the Howell man in your area, or write the factory direct for Bulletin GM-1.



HOWELL MOTORS

HOWELL ELECTRIC MOTORS COMPANY, HOWELL, MICHIGAN

MOTORS FOR INDUSTRY SINCE 1915



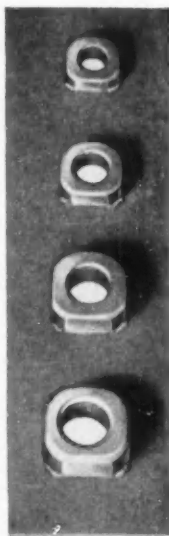
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No matter what your product—whether big or small—if there's metal fabricating, fastening, or assembling involved, chances are you can use Midland Welding Nuts to big advantage.

Now relied on by manufacturers the world over—and specified universally by product designers—Midland Welding Nuts will lower your assembly costs and speed up operations all along the line for you.

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Manufacturers of

**AUTOMOBILE AND
TRUCK FRAMES**

**AIR AND VACUUM
POWER BRAKES**

**AIR AND ELECTRO-PNEUMATIC
DOOR CONTROLS**

continue until the novelty of the new models has worn off.

General Demand

There is, in fact, no real certainty at present as to the pattern of general demand. More specifically, there is no positive evidence as yet that the gains in production which have occurred since Labor Day are being matched or are likely to be matched by increases in demand. This question should be greatly clarified when data on Christmas trade become available. Until it has been demonstrated that the pattern of demand is improving, the contention that the economy has entered a phase of sustained revival will be lacking in persuasiveness.

AIRBRIEFS

(Continued from page 98)

for the F3H Demon fighter and no plant employment cutbacks are anticipated. The Allison J71 engine in an Air Force version will also continue in production for the Douglas B-66 light bomber.

Piper Production

Piper Aircraft Corp. reveals that it has firm orders for its twin-engine Apache executive aircraft booking production through July 1, 1955. Production has already exceeded the original one-a-day schedule and plans are being studied to increase to a two-a-day schedule. An airline in Bogota, Colombia, has ordered six Apaches for regular airline passenger service. Piper now has a backlog of \$6 million, largest in its history, for its various models and reveals that 97 per cent of all Piper purchasers use the airplanes for business purposes. Purchasers include manufacturers (27.5 per cent), wholesalers-distributors (15.8 per cent), construction firms (12.2 per cent), physicians (9.2 per cent), engineers and architects (6.2 per cent) and the remainder miscellaneous business users.

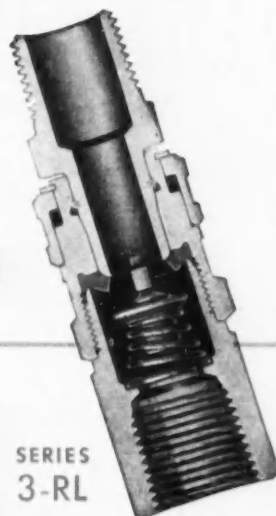
Non-stop Battle

Three major U. S. airlines are seeking the lucrative non-stop New York-Mexico City route authorization by the Civil Aeronautics Board. All three, American Airlines, Eastern Air Lines and Pan American World Airways, plan to use the Douglas

(Turn to page 174, please)

Everything You Want

**in a Quick-Connective
Pneumatic Coupling**



HANSEN

SERIES 3-RL

RING-LOCK COUPLING

Compactly designed, the Hansen Series 3-RL Coupling *effectively* handles far more volume than any coupling of equal dimensions. On any job requiring $\frac{3}{4}$ " to $\frac{1}{8}$ " connections—from the air line to the air tool—this single size Hansen Ring-Lock Coupling—with completely interchangeable Sockets and Plugs—does it all—makes it easy to keep stock of parts in balance—holds inventories to a minimum.

To connect the Series 3-RL Coupling, you merely push the Plug into the Socket. To disconnect, just turn the sleeve. When Coupling is connected, a locking ring in Socket is forced into groove in Plug, provides positive lock and insures tight fit. Sockets are brass with steel sleeves. Plugs are steel. Sockets for use with small hand-operated air tools are available in aluminum.

- Smaller.
- Lighter.
- Effectively handles more volume than any other coupling of equal dimensions.
- Handles any job with fittings from $\frac{3}{4}$ " to $\frac{1}{8}$ ", from the air line to the air tool.
- All Series 3-RL Sockets and Plugs are interchangeable—reduces stock inventory to a minimum.
- One-way shut-off—for pneumatic service applications.
- Positive locking.
- Equipped with automatic sleeve lock.



Write for Descriptive Literature

THE HANSEN



MANUFACTURING COMPANY

4031 WEST 150th STREET

CLEVELAND 11, OHIO

USS Carilloy Steel triples life of

Steel analysis worked out between customer and USS Service Metallurgists gives bits better hardenability, greater resistance to abrasion and abuse.

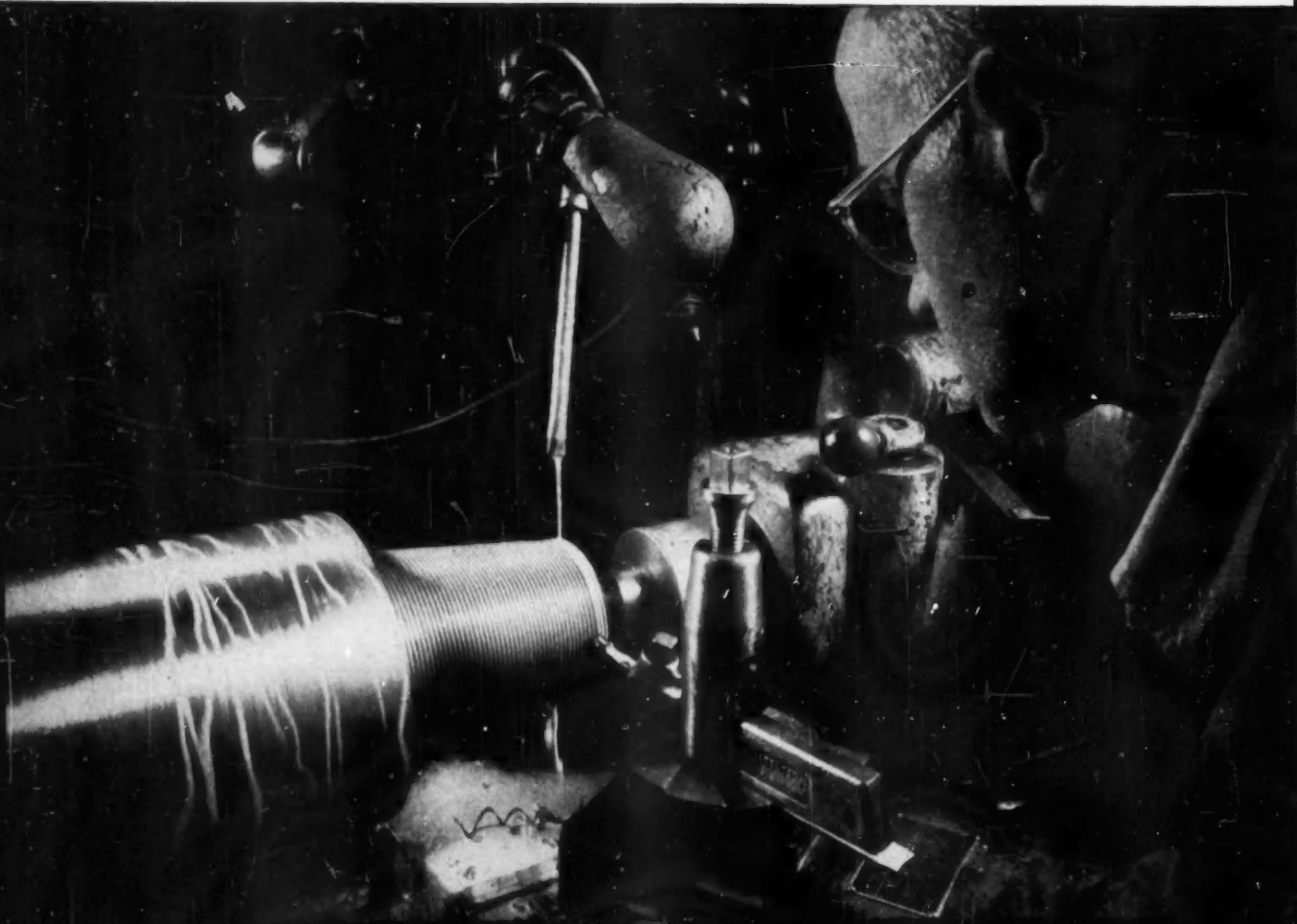
● Spang and Company, Butler, Pennsylvania, manufactures a complete line of cable system drilling tools for oil, gas, and water wells, for prospect drilling, and for shot blast holes. Spang's famous Heat Treated Molloy Bits are made especially for extremely hard, irregular formations, and they must be hard enough to chew through rock, sand, and shale quickly . . . tough enough to withstand a tremendous daily pounding without breaking . . . and durable enough to stay sharp in the most abrasive formation. Spang gets these needed properties in a Carilloy Steel that was recommended by USS Service Metallurgists.

These Molloy Bits cut faster, cost less per foot of hole

drilled, and require field dressing and hardening less often than conventional bits. One drilling operator, who switched to Molloy Bits made of Carilloy Steel, increased the amount of hole he could drill between redressings from 15 feet to 58 feet. The Molloy Bits lasted almost four times as long as ordinary bits.

In any rugged application where service is severe—where you need exceptional resistance to abrasion, great toughness or hardness, unusual resistance to abuse, or any combination of these properties—look for a USS Carilloy Steel. And get the help of an experienced USS Service Metallurgist when you have a tough material or production problem.

BELOW, API taper joint and collar of Molloy Bit are turned. The wire-like chip under the piece indicates the high quality and toughness of this Carilloy Steel.





drill

bits

ABOVE, forging flash is ground off semi-dressed blade end of a Molloy Bit. Blade end is dressed to gauge in the field, and redressed periodically when ends wear down. Molloy Bits made of Carilloy Steel last longer, require less frequent redressing than conventional bits.

UNITED STATES STEEL CORPORATION, PITTSBURGH • COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO

TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA. • UNITED STATES STEEL SUPPLY DIVISION, WAREHOUSE DISTRIBUTORS

UNITED STATES STEEL EXPORT COMPANY, NEW YORK

Carilloy  Steels

ELECTRIC FURNACE OR OPEN HEARTH

COMPLETE PRODUCTION FACILITIES IN CHICAGO OR PITTSBURGH

UNITED STATES STEEL

AIRBRIEFS

(Continued from page 170)

DC-7 for the service in first-class fare schedules and Eastern would use its Lockheed Super Constellation for coach service. First class fare would be \$130.45 and coach fare \$94.15. American Airlines now operates a New York-Mexico City service via Dallas, Tex. One of the valuable uses of the service is to deliver Mexico City passengers to New York City en route to trans-Atlantic airlines.

Comet Aftermath

As a result of the DeHavilland Comet tragedies, the British Air Registration Board is studying more stringent certification requirements for future jet passenger liners. Our own Civil Aeronautics Administration will follow ARB requirements, which include the use of two fuselages for static tests and underwater pressurization tests, extensive flight tests with a prototype aircraft over the proposed routes to be operated, and increased attention to stress reports and structural analysis. It will

be recalled that Comet accidents were traced to the failure due to metal fatigue of window frames in the forward fuselage. ARB has asked for an extensive research program on metal fatigue in light alloys for future use of jet transport designers.

First Class Air Mail Future

The "experiment" in which all first-class mail has been carried by air between Washington-Chicago and New York-Chicago has proved so successful that the Civil Aeronautics Board is now studying the idea on a nationwide basis. The Board has previously established temporary payment rates for the East Coast, the West Coast and for local service carriers. The Board plans to hold open hearings on extension of the East Coast service to other Eastern cities. The railroads, which are deprived of the mail carried by air, hold the program is illegal and may seek a court test in order to stop the service.

Helicopter Lighting

The increasing use of the helicopter at night has posed the problem of lighting it in such a way that it is unmistakable from a conventional aircraft. Current helicopters use a series of blinking and flashing lights which are not completely useful at a distance. Civil Aeronautics Administration is studying the use of rotor-tip mounted lights, producing a complete halo of light visible—and unmistakable—for several miles. The problem has been to develop a lamp capable of sustaining the high loads developed by the rotor-tip position. CAA is studying an installation that weighs less than a pound, uses less than 300 watts power and is visible against a background of city lights for 6.5 miles.

Chicago RIVET "912"

AUTOMATIC RIVET SETTER

CUTS COSTS 3 WAYS

- 1 FASTENS FASTER . . .**
Only the speed of the operator limits the 912's riveting speed. Completely automatic. A push on the foot pedal automatically feeds, inserts and clinches the rivet.
- 2 DOES WORK OF SEVERAL MACHINES**
Quick change rotary hopper and race-way makes the 912 adjustable in 5 to 10 minutes to set different size rivets. Adjustable anvil height and 12-inch throat provide further versatility.
- 3 SAVES ON MAINTENANCE . . .**
The 912 is massively built to stand the shocks of constant use and is designed for quick, easy servicing and parts replacement.

If your assembly calls for 3/16" steel tubular rivets or smaller, of 15/16" lengths or less, ask us to show you how the 912 can cut your fastening costs. Send a sample of your problem assembly (or blueprint) for a free fastening analysis.





FREE CATALOG

contains valuable engineering information and rivet specifications plus illustrated descriptions of 26 Chicago Automatic Rivet Setters.

Chicago Rivet & MACHINE CO.

9612 West Jackson Boulevard, Bellwood (Chicago Suburb) Illinois

Branch Factory: Tyrone, Pa.

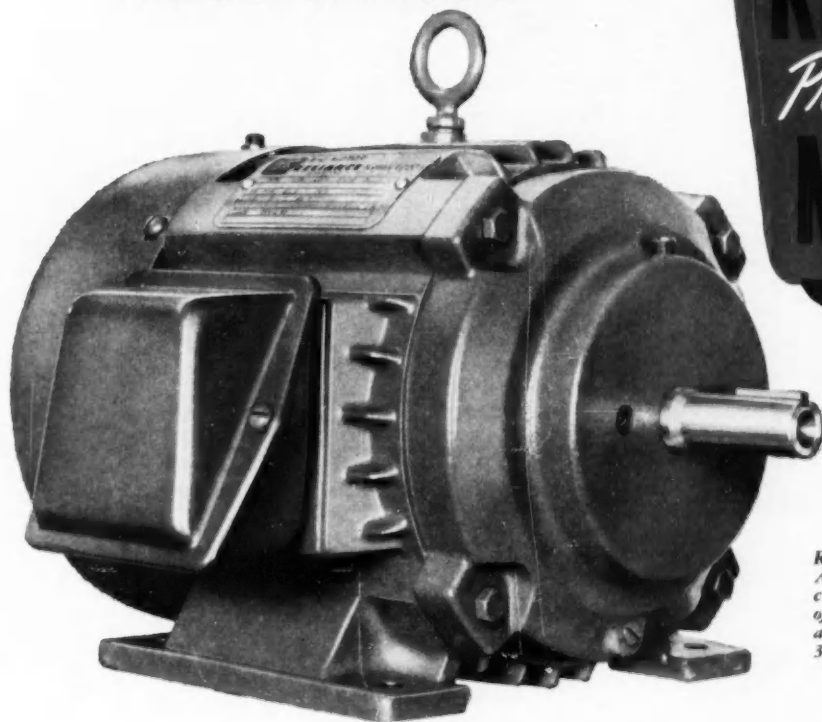
BOOKS . . .

PUBLICITY FOR PRESTIGE AND PROFIT, by Howard Stephenson and Wesley Fiske Pratzner, published by McGraw-Hill Book Co., Inc., 330 West 42nd St., New York 36, N. Y. Price, \$4.50. This manual not only shows every channel for publicity, and how to find, prepare, and place material for it—but also shows publicity as the keystone of public relations in a way that will save waste motion and get better results. Out of long experience, both in company and counseling work in this field, the authors give clear directions on all the techniques of publicity, in a light and readable manner, backed up with plenty of case examples. What to look for as sources of publicity material, and how to handle it correctly, are fully covered.

FOR RUGGED SERVICE...

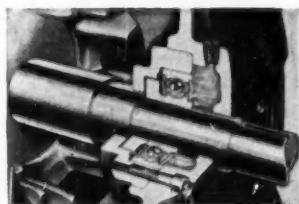
*"All motors are
NOT alike!"*

RELIANCE
Precision-Built
MOTORS



*Reliance Totally-enclosed Fan-cooled
A-c Motor. All other standard en-
closures available, with wide choice
of mechanical and electrical designs
and special mountings. Ratings from
3/4 to 300 hp.*

- ☆ Heavy shafts, bearing to bearing
- ☆ Indestructible pressure-cast rotors
- ☆ Shock-resistant frame and bearing-bracket construction



... AND THE BEST PRE-LUBRICATED BEARING DESIGN

The Reliance pre-lubricated bearing provides *four times more operating hours without re-lubrication* than any other bearing used in motors today. And—whatever your lubrication schedule—you just can't grease 'em wrong! To get the complete "inside story" on motor bearings, write today for new Bulletin B-2202. It contains hard facts on the advantages of the Reliance pre-lubricated bearing design, with cutaway view, cross-section diagram, comparison chart, and statements by bearing manufacturers. B-1458V

RELIANCE **ELECTRIC AND**
ENGINEERING CO.

1123 Ivanhoe Road, Cleveland 10, Ohio • Sales Representatives in Principal Cities



with this WISCONSIN-POWERED UNIT!

This sturdy unit takes a six-foot-wide bite in any kind of snow, loading from 7 to 12 cubic yards of snow per minute in trucks or throwing it clear. Builder is Krause Industries, Baraboo, Wisconsin and the snow blower is constructed to mount easily and quickly on the Hough Payloader Tractor-Shovel. A Wisconsin Heavy-Duty Air-Cooled Engine provides the power.

Equipment builders and buyers are choosing Wisconsin Engines over all other types in the 3 to 36 hp. range . . . as the most satisfactory and fool-proof power to fit both the job and the machine. You'll find a model and size available to fit every power requirement . . . 4-cycle single-cylinder, 2-cylinder and V-type 4-cylinder models, 3 to 36 hp. Write for Bulletin S-164.



WISCONSIN MOTOR CORPORATION

World's Largest Builders of Heavy-Duty Air-Cooled Engines
MILWAUKEE 46, WISCONSIN



mail coupon now for free demonstration or literature!



saves
80% of
boring time

DEKA-BORE (and only DEKA-BORE) can be adjusted in fractions of 1/10,000" on the full diameter as easily as reading 1/16" on a steel rule. NOT A VERNIER OR SCROLL ADJUSTMENT. Can be calibrated in increments of .00005 on radii or .0001 on diameter as easily as picking up .002 on a conventional micrometer dial.

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Gentlemen: Please send me

- ☐ Name of nearest DEKA-BORE distributor, who will arrange free demonstration.
☐ Free literature and prices.

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ADDRESS _____
CITY _____ ZONE _____ STATE _____

Industry News

(Continued from page 104)

Congress May Kill Tax Reductions

Automatic reductions in automotive excise taxes and in the corporation tax rate next April 1, as provided in the last tax law, may not be forthcoming. Indications now are that the Administration will press for continuation of the levies at their present level because of the squeeze on the budget due to lower tax revenues.

As originally provided in the law, excise taxes on cars would drop to seven per cent from 10, and to five per cent from eight on trucks and automotive replacement parts. At the same time, the corporation tax rate would drop from the present 52 per cent to 47 per cent.

In order for the present rates to be maintained, enabling legislation would have to be enacted by the new Congress. Even though control has passed to the Democrats, general opinion is that practical politics would dictate their cooperation with the Administration on the tax request.

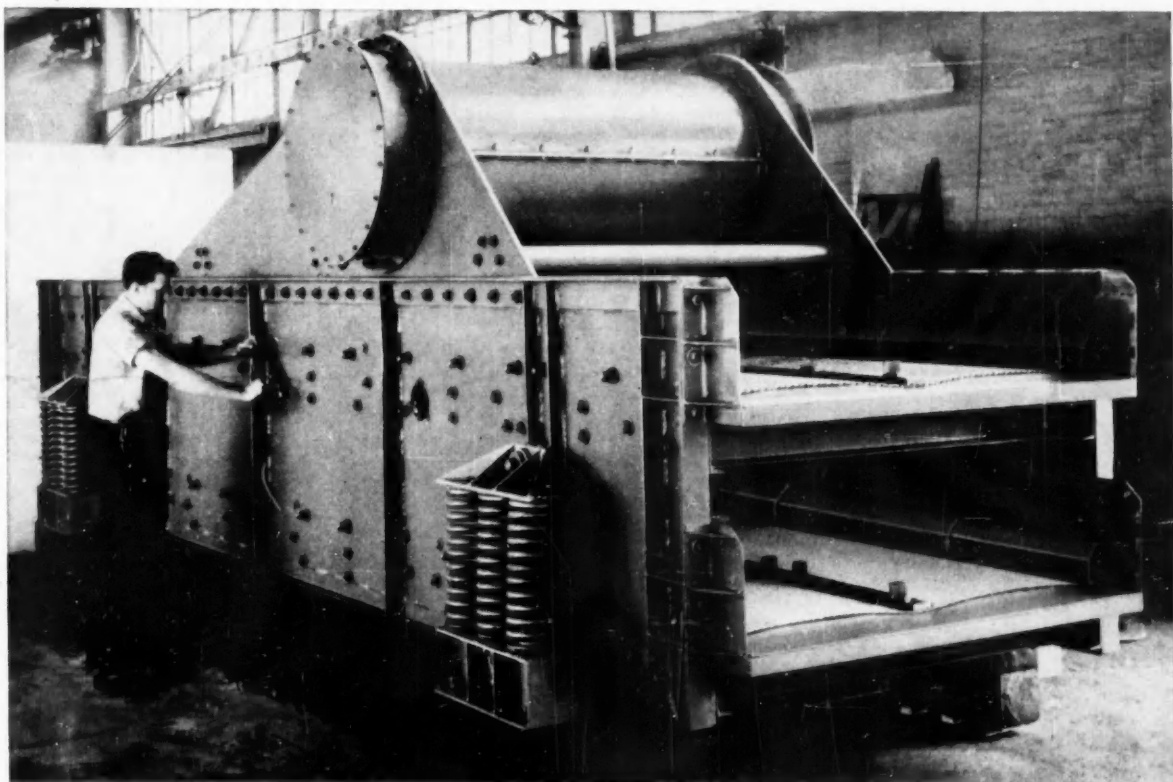
Brockway Sells Facilities To H & B American Machine

Under present plans, H & B American Machine Co., Inc., Chicago, will continue to manufacture trucks and tractors previously built by Brockway Motor Co. H & B purchased some of the Brockway facilities and leased the company's truck manufacturing plant in Cortland, N. Y., with an option to buy it. The purchase price reportedly was approximately \$6 million. H & B has been producing aircraft parts, drop forgings and fabricated sheet metal products.

Chrysler Ups Output Of Cars 10 Per Cent

Public reception of Chrysler Corp.'s 1955 lines, closely watched by the industry, has been quite favorable. Dealers are pressuring the factory for more cars, and production schedules have been hiked 10 per cent to meet demand. Chrysler expects to build 280,000 cars in the last quarter. The rush of orders following public showing was running twice the assembly line rate for the first two or three weeks. At Thanksgiving, orders on books stood at 350,000, and were coming in at rate of 10,000 a day.

(Turn to page 178, please)



ASSEMBLING an RB&W high-strength bolt on Hewitt-Robins' new Eliptex vibrating machine.

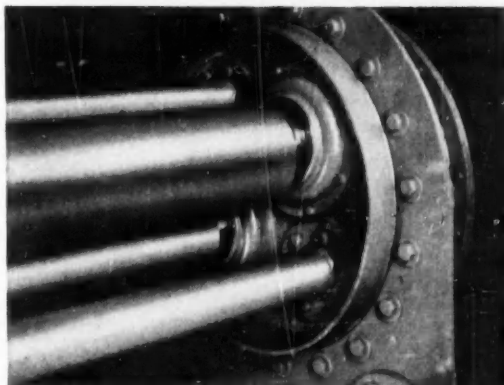
Standardizing on high-strength bolts saves Hewitt-Robins 25%—improves product!

Take a hard look at your fastening operations and you may find you will save a lot by using standard high-strength bolts instead of expensive specials.

Using a standard RB&W high-strength bolt plus a heavy semi-finished nut with two hardened washers, Hewitt-Robins is getting these advantages and savings on vibrating machines: 1. Saving 25% in yearly fastener cost. 2. Eliminating situations requiring body-bound connections with attendant reaming operations. 3. Eliminating all special, finished bolts with varied thread lengths and also all special lock nuts. 4. Eliminating procurement problems and slow delivery of specials. 5. Reducing nut and bolt inventory. 6. Obtaining better performance and lower maintenance on units.

The RB&W product has $2\frac{1}{2}$ to 3 times the clamping force of the previous fasteners. Thus the assembled connection is better able to withstand severe vibration.

Maybe your operation doesn't give fasteners as hard a time as vibrating equipment, but it pays to look into the savings you can expect from specifying standards instead of specials. RB&W has the answers to your questions.



DETAIL VIEW of Hewitt-Robins vibrator, showing RB&W high-strength bolts which must resist shear stress as well as vibration.

4.8

See our insert on high-strength bolts in Sweet's Architectural and Industrial Construction Files.

RB&W

RUSSELL, BURDSALL & WARD

109 YEARS MAKING STRONG THE THINGS THAT MAKE AMERICA STRONG

Plants at: PORT CHESTER, N.Y.; CORAOPOLIS, PA.; ROCK FALLS, ILL.; LOS ANGELES, CALIF. Additional sales offices at: ARDMORE (PHILA.), PA.; PITTSBURGH; DETROIT; CHICAGO; DALLAS; SAN FRANCISCO. Sales agents at: NEW ORLEANS, DENVER, SEATTLE. Distributors from coast to coast.

Industry News

(Continued from page 176)

New U. S. Directive Issued On Buying Machinery, Tools

An individual military service requiring new machines or tools will have to go first to other military departments and their contractors to see if similar tools are available before it can purchase new ones from the outside, under a new directive issued

by the Defense Department. The directive also specifies that each service must get an approval for the purchase of equipment which costs more than \$1 million.

Before a purchase is approved, a service needing the equipment will have to submit a detailed report describing the items it needs, what it needs them for and list its production requirements from the proposed facility. All services will also have to turn in a report by June of every year detailing their proposed industrial projects.

Price of Refined Nickel Up 4½ Cents a Pound

An increase of 4½ cents per pound in the price of refined nickel has been announced by International Nickel Co., Inc. This brings the price of the metal to 64½ cents per pound in the U. S. and 61.4 cents in Canada at existing exchange rates. The company imports the metal from the Port Colborne refinery in Ontario.

Similar price increases have been applied to nickel oxide sinter and other forms of primary nickel. Likewise, a new price schedule has been put into effect for nickel and nickel alloys in the form of mill and foundry products produced at the company's U. S. and United Kingdom subsidiaries. The company stated that higher production costs were responsible for the price changes.

World Plastics Fair in April Keyed to Big Western Industry

More than 25,000 Western business men and manufacturers received invitations last month (November) to attend the West's first major plastics exposition. It will be held in Los Angeles, Calif., April 6 to 10, 1955.

The World Plastics Fair and Trade Exposition is keyed to the rapidly expanding production and demand for plastics in the Western states. There is widespread opinion that sale of products made wholly or in part from plastics in the West are rapidly approaching a billion-dollar-a-year level.

Along with the display at the exposition of thousands of products in group and individual exhibits by U. S. and foreign plastics producers, actual processing of plastics will take place in equipment exhibits. Classifications of commercial firms who will exhibit are: raw plastics producers; machinery, tool and equipment makers; plastics processors, fabricators and special service producers; and engineering and design services.

Brochures describing features of the show may be obtained by writing: World Plastics Fair and Trade Exposition, Inc., in care of the exposition management, Consolidated Advertising Directors, 8762 Holloway Drive, Los Angeles 46, Calif.

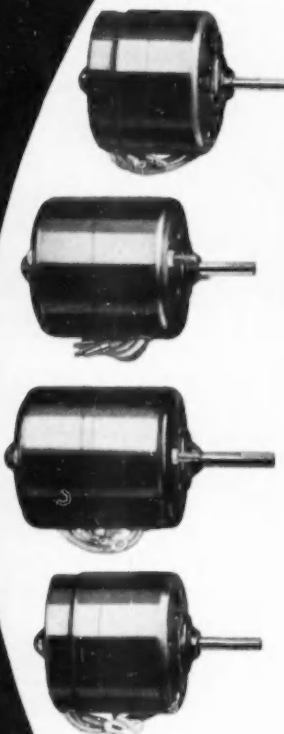
De Soto Reports Backlog Of Orders for 1955 Cars

Despite accelerated production in the last several weeks, De Soto entered December with a backlog of orders for the 1955 model automobiles. Many orders are not expected to be filled until the latter part of January, as things stand now.

Leece-Neville

... a reliable
source for
SMALL MOTORS
in LARGE
VOLUME

- for • HEATERS • WINDSHIELD WIPERS
• DEFROSTERS • SEAT ADJUSTERS
• AIR CONDITIONERS • CAR COOLERS
• PUMPS • WINDOW REGULATORS
• MARINE VENTILATORS



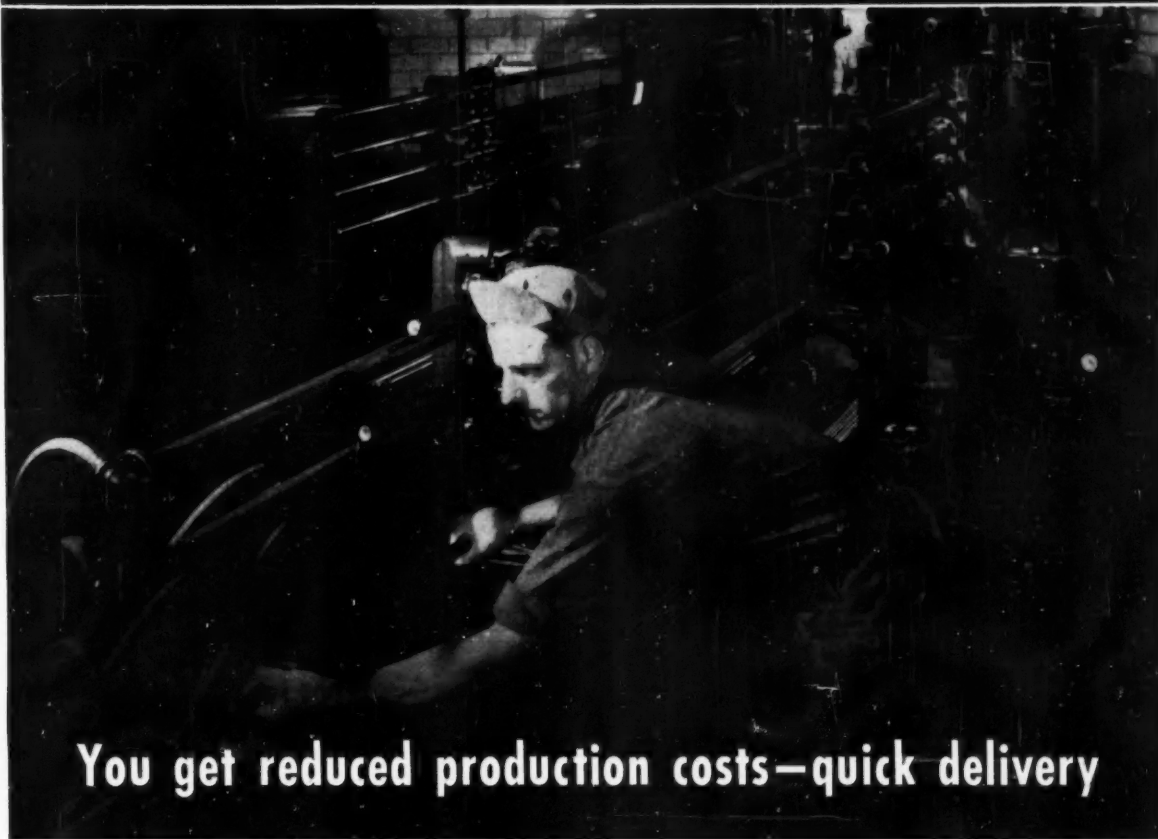
Leece-Neville Small Motors are produced for automotive use in 6 volt to 32 volt systems. Higher voltage motors are available for other applications. For full information, write The Leece-Neville Company, Fractional H. P. Motors Division, Cleveland 13, Ohio.

YOU CAN
RELY ON

Leece-Neville

AUTOMOTIVE ELECTRICAL EQUIPMENT
SINCE 1909

WHY IT PAYS TO BUY MX SCREW STOCK FROM US



You get reduced production costs—quick delivery

• Hundreds of shop cases have shown that USS "MX" free-machining bar stock cuts unit costs considerably . . . an average of 10% to 15%, sometimes as high as 42%. And the more machine work your parts require, the greater the savings.

Here's how you cut costs when you use "MX" rather than other free-machining grades:

You get more parts per hour, longer tool life with less down time for grinding and adjustment, fewer

rejects, closer tolerances and better part finish.

One of our qualified sales representatives will gladly discuss the advantages of "MX" with you as they apply to your particular shop requirements. And you can always depend upon quick delivery from the nearest U.S. Steel Supply warehouse.

In addition to "MX" stock, we carry: cold finished rounds, squares, hexagons, flats and precision shafting in all grades.

'TRIPLE SECURITY'

**What you want
When you want it
At the right price**

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DIVISION

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Warehouses and Sales Offices
Coast to Coast



UNITED STATES STEEL

New Defense Facilities

SUPPLEMENTING the list of Certificates of Necessity issued up to October 6, 1954, authorizing new or expanded defense plant facilities for the manufacture of automotive and aviation war goods which was published in the November 15 issue, page 156, of **AUTOMOTIVE INDUSTRIES**, the following additional certificates were announced by the Office of Defense

Mobilization, covering the period from October 7 to November 3, 1954.

The figure appearing in parentheses is the percentage authorized in respect to actual fast tax write-offs.

AIRESEARCH MANUFACTURING CO. OF ARIZONA, Div. The Garrett Corp., Phoenix, Arizona
Aircraft parts—\$156,581 (65)

AIRESEARCH MANUFACTURING CO., Div. The Garrett Corp., Los Angeles, Calif.
Military aircraft components—\$478,055 (65)

BENDIX AVIATION CORP., Scititola Div., Sidney, New York
Aircraft components—\$18,248 (65)

BOEING AIRPLANE CO., Seattle, Wash.
Military aircraft—\$348,041 (60)

THE CESSNA AIRCRAFT CO., Wichita, Kan.
Military aircraft—\$34,658 (60)

CONSOLIDATED INDUSTRIES, INC., West Cheshire, Conn.
Steel, titanium and aluminum aircraft—\$54,910 (65)

CONTROL INSTRUMENT CO., INC., Brooklyn, N. Y.
Military electronic products—\$271,837 (65)

CURTIS-WRIGHT CORP., Wright Aeronautical Div., Wood-Ridge, N. J.
Military aircraft engines—\$455,719 (50)

THE DALTON FOUNDRIES, INC., Warsaw, Ind.
Ordnance components—\$93,000 (55)

DELAVAN MANUFACTURING CO., West Des Moines, Iowa
Aircraft components—\$60,000 (45)

DOUGLAS AIRCRAFT CO., INC., El Segundo, Calif.
Military aircraft—\$55,977 (65)

FAIRCHILD ENGINE AND AIRPLANE CORP., Fairchild Aircraft Div., Hagerstown, Md.
Military aircraft—\$29,622 (65)

FAIRCHILD ENGINE AND AIRPLANE CORP., Stratos Div., Bay Shore, N. Y.
Military aircraft accessories—\$32,995 (65)

KEARFOTT CO., INC., Little Falls, N. J.
Precision scientific instruments for defense—\$81,650 (65)

LOCKHEED AIRCRAFT CORP., Burbank, Calif.
Military aircraft—\$63,160 (60)

LOCKHEED AIRCRAFT CORP., Missile Systems Div., Van Nuys, Calif.
Research and development—\$1,100,000 (60)
Ordnance—\$85,910 (60)

THE GLENN L. MARTIN CO., Baltimore, Md.
Military aircraft—\$43,925 (60)

NORTHROP AIRCRAFT, INC., Hawthorne, Calif.
Military aircraft—\$46,689 (60)

OLD KING COLE, INC., Louisville, Ohio
Aircraft components—\$93,180 (50)

THE OLIVER CORP., York, Pa.
Ordnance—\$45,981 (65)

S-K-S DIE CASTING CO., Berkeley, Calif.
Aircraft parts—\$227,740 (65)

UNION CARBIDE & CARBON CORP., Niagara Falls, N. Y.
Research and development—\$1,957,229 (50)

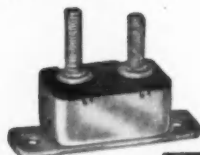
5 small parts to solve BIG PROBLEMS

Some of the smallest parts are big factors in helping a car earn and keep a good reputation.



FASCO LOW PRESSURE INDICATING SWITCH

Dependable signal of dangerous low-pressure—as in engine lubricating or air brake systems.



FASCO AUTOMATIC RESET CIRCUIT BREAKER

Precision calibrated—Permanent protection for electrical equipment—Instant mounting.



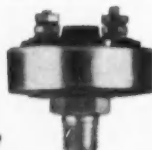
FASCO DIRECTIONAL SIGNAL FLASHER

Compact—Rugged—Adaptable to all circuits—Safe—Economical (no fuse needed).



FASCO HYDRAULIC STOPLIGHT SWITCH

Accurate—Extremely high safety factor—Proved through 26 years as standard original equipment.



FASCO SERIES 400 PRESSURE SWITCH

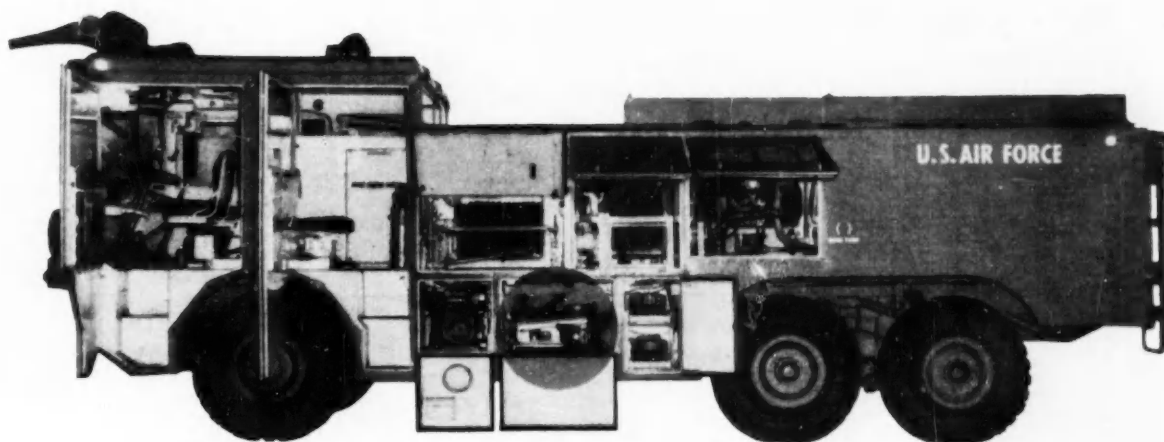
Versatile (for low and medium pressure applications)—Reliable Available in many forms.

*Fasco Electrical Equipment
Serves the Automotive Industry*



BOOKS...

GERMAN-ENGLISH DICTIONARY OF AUTOMATIC CONTROL TERMS, published by American Society of Mechanical Engineers, 29 West 39th St., New York 18, N. Y. Price, \$9.50. Reading and translation of German literature on automatic controls is made easier by this dictionary. It lists about 750 German words and their English translations or equivalents. Many of these terms are not to be found in current German-English scientific dictionaries.



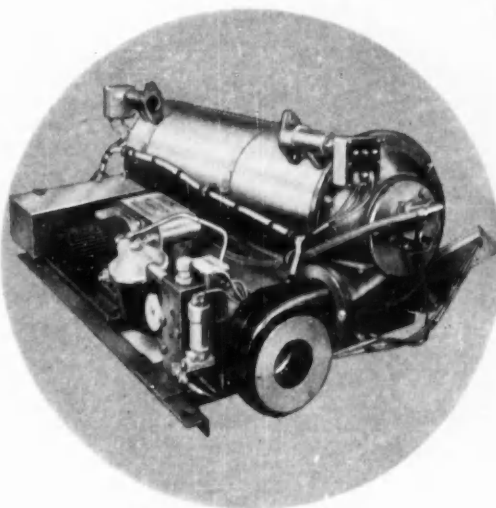
everything has to work...and it does!



Test personnel of the Air Proving Ground Command recently returned after more than 1000 hours of Operational Testing on the Type 0-11A USAF Crash Truck built by American-LaFrance-Foamite. A Janitrol 90,000 Btu/hr. Liquid Heater is standard equipment on this all-weather vehicle, and supplies all heating requirements.

No difficulties of any kind were experienced with the Janitrol heater in the 0-11A Crash Truck during the entire arctic test period. Not once was any service necessary! Defrosting of the windshield was adequate with the assistance of the wipers in combatting the after-squirt from the turret dispenser nozzles. In a minus 41° F ambient temperature cab comfortization was maintained at plus 66° F, and in addition the Janitrol Heating Unit provided standby heat for the vehicle engine, pump engine, hose reel compartments, battery compartment and auxiliary power generator compartment. The main water storage tank was protected from freezing by a heat exchanger submerged in the tank.

No matter what kind of heat you may need—specify "Janitrol" and be sure of performance and dependability.



HEAT WHEREVER YOU WANT IT



Janitrol

AIRCRAFT-AUTOMOTIVE DIVISION, SURFACE COMBUSTION CORP., COLUMBUS 16, OHIO

District Engineering Offices: New York, 225 Broadway; Washington, D. C., 4650 East-West Highway; Philadelphia, Penna., 401 No. Broad St.; Kansas City, Mo., 2201 Grand Ave.; Fort Worth, 2509 Berry St.; Hollywood, Calif., 7046 Hollywood Blvd.; Columbus, Ohio, 400 Dublin Ave.



GET RAPID-FIRE PRODUCTION

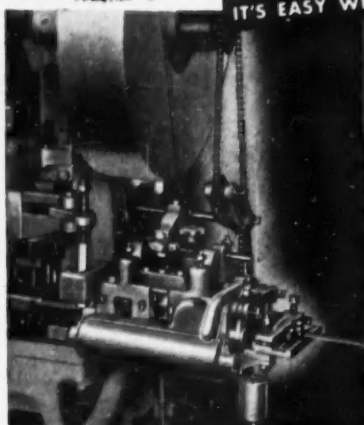
from your PUNCH PRESSES

IT'S EASY WITH

WITTEK

Automatic Roll Feeds

Wittek automatic roll feeds fit all makes and sizes of punch presses—provide maximum efficiency and extreme accuracy in the high speed automatic feeding of strip stock. Made in single roll, double roll, and compound types with straighteners, in models to feed (push or pull) in any direction. Length of feed is easily adjusted to meet individual requirements.



WITTEK Reel Stands

Simplify Handling of Coiled Stock

Choice of standard models to facilitate handling coiled stock . . . from small, light coils to those weighing up to 800 pounds. Larger reel stands automatically center the coils — provide frictional braking action to prevent overrunning, maintain uniform coil slack.

**Write for
Full
Particulars**

WITTEK Manufacturing Co.

4319 W. 24th Place, Chicago 23, Illinois

Automatic

ROLL FEEDS AND

REEL STANDS



**F.O.S.[®] IS VERSATILE,
AN AID TO ANY WORKER'S SKILL.
IT DOES AT LEAST A SCORE OF TASKS!
COVERS, HOLDS, SEALS, OR MASKS!**

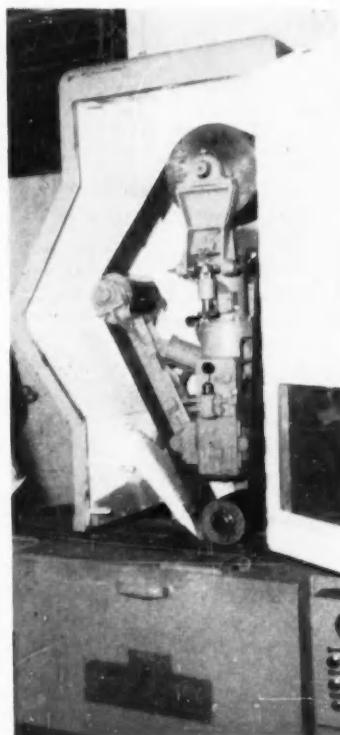
**You tape it best with F.O.S. Industrial Tape . . . product of
THE SEAMLESS RUBBER COMPANY
NEW HAVEN 3, CONN., U.S.A.**

Write for samples, literature, prices †Friction One Side

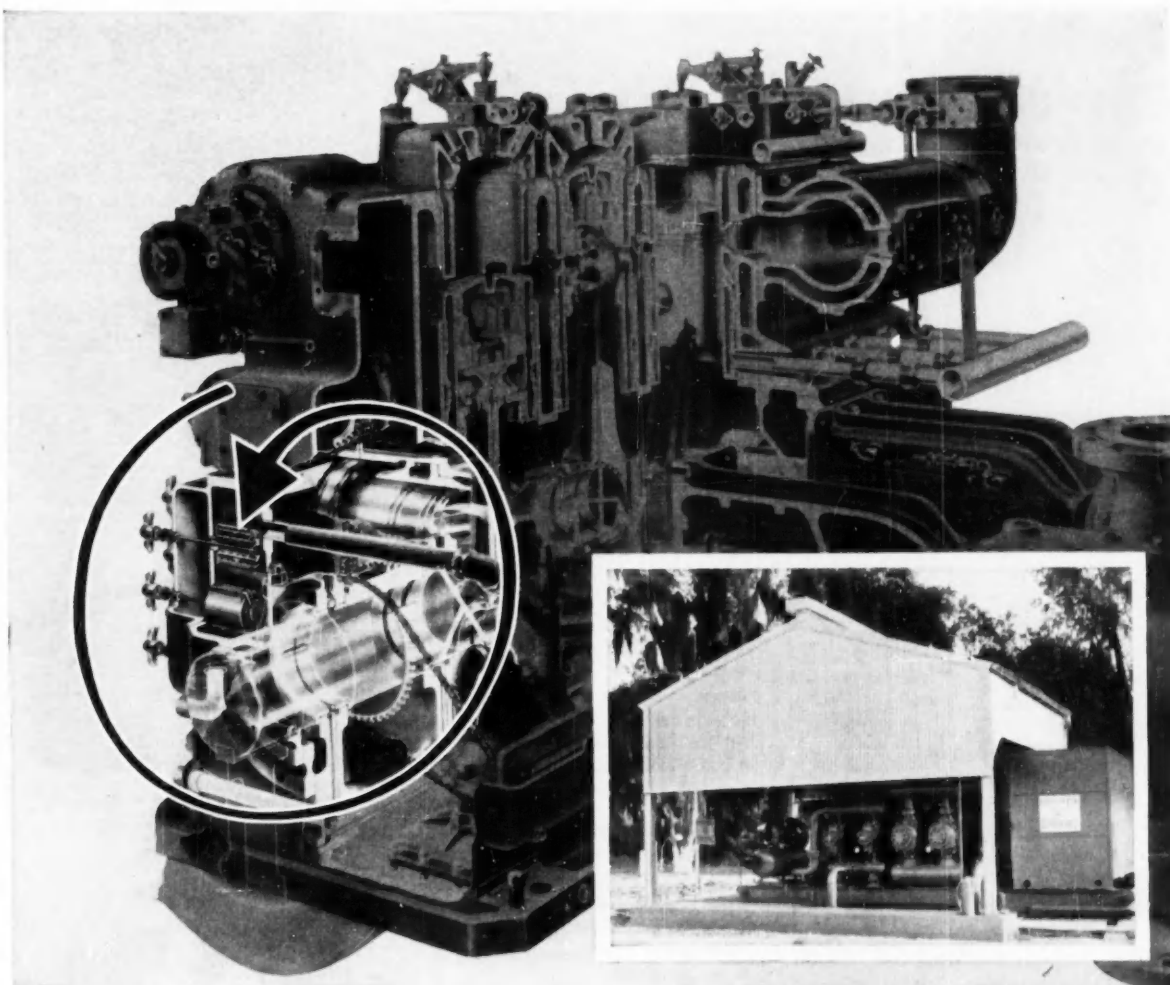
News of the MACHINERY INDUSTRIES

(Continued from page 80)

Much equipment has clearly been designed for automated production. Rotary tables with many stations for presenting work in sequence to a series of belt heads were shown by three manufacturers. A complexly articulated belt head which can follow compound curves along the length of Detroit's most intricately curved bumper without change in belt-to-work pressure stumped the mechanical ingenuity of many viewers. A duplex centerless grinding unit, the first with two belt stations in one unit which can be operated either dry or wet (lubricated), typified the invasion of abrasive-belt using apparatus into an



Among the new machines at the Behr-Manning Metallfinishing Show was a conveyorized micro-polisher with a 12-in. abrasive belt for the deburring of broached or stamped parts at a pace of 40 to 120 per minute depending upon the number of parts (two to five) which can be placed side-by-side across the conveyor belt. A compressed-air port at the edge of the belt controls both tracking over the contact drum and oscillation across the work. Belt speed of this Murray-Way machine is 500 fpm



Purolator-protected Clark Midget Angle Compressor, gas-engine-driven. Skid-mounted for portability, Clark Compressor is a favorite for field gas gathering, gas lift, repressuring, flare gas elimination, pipeline testing and recycling plant feeders. Manufactured by Clark Bros., Co., Olean, New York.

Where does the **DIRT** belong?

OUTDOOR ENGINES, like outdoor boys, can't help getting dirty. But dirt will harm neither boys nor engines if steps are taken to get rid of it promptly!

In the Clark Compressor above, Purolator* Metal Edge Filters remove harmful combustion by-products and foreign matter entrapped in air or fuel lines supplying the engine. Purolator Fuel and Lube Filters . . . first line of defense against down time . . . are used on many other well-known "outdoor" engines, too.

Purolator Metal Edge Fuel Filters—equipped

with corrosion-resisting brass, monel or stainless steel elements—are available from $\frac{1}{4}$ in. to 15 in. diameter. Element spacing can be supplied to your requirements, from .001 in. to .025 in.

Write for the newest *Purolator Industrial Catalog*, your guide to the best in filtration equipment. Remember too . . . our Engineering Department will help you solve filtration problems, small or large.

*Reg. U. S. Pat. Off.

PUROLATOR PRODUCTS, INC., Rahway, N. J., and Toronto, Ontario, Canada



Producers Pare Stamping Costs

Modern Coil Handling Equipment Widens Use of Low Cost Coil Stock

The battle to keep down costs is going well for producers of stampings. Coil stock and modern coil handling equipment are the decisive factors. Coil stock, with only two scrap ends to its entire length is far more economical than strips of straight stock with two scrap ends to every ten feet. Moreover, the type of coil loading and handling equipment built by F. J. Littell Machine Co. makes coil stock easier to handle than straight stock. Stamping producers are taking full advantage of these developments. Coil stock and Littell Coil Hooks, Reels, Straightening Machines and Automatic Roll Feeds are in wider use today than ever before.

Hooks Serve Two Ways

... Littell Hooks make it a simple matter to unload coils on delivery, and to load reels. The variety of sizes have lifting capacities from 1,000 to 40,000 pounds.



Two Types of Reels

Littell Coil Cradle Reels mount heavy coils, up to 30,000 pounds. Spindle Reels handle coils up to 40,000 pounds. Each type is available in plain or motor driven designs.



Straighteners Flatten Stock... Removing curvature from coil stock as it passes from reel to punch press die is the function of Littell Straightening Machines. All models are the same basic design. Variation is in the number and diameter of straightening rollers employed... from 1" to 90" in width, and from .010" to .125" thickness.



Automatic Roll Feeds... Press output in many shops has been multiplied five times by simply attaching Littell Roll Feeds to presses for blanking, drawing, piercing, or cut-off work. The Littell Roll Feed is used with compound dies, single station dies, and progressive dies. Standard models are easily attached, serve all types of presses, and handle all standard widths and thicknesses of stock.

Descriptive details and prices on Littell Hooks, Reels, Straighteners and Roll Feeds are available on request. Inquiries are given immediate attention when addressed to

F. J. Littell Machine Co.

4107 N. RAVENSWOOD AVE.
CHICAGO 13, ILL.

area heretofore restricted to cutting tools or hard abrasive wheels.

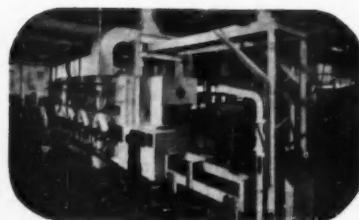
Roll polishers, air tools, lubricants, dust collectors, carbide tool sharpening equipment, new abrasive wheels with the coated materials arranged radially rather than circumferentially, pneumatically operated backstands, automatic feeding tables for addressing a whole series of parts sequentially to vertical belt surfacers, and conveyor feeding and magnetic-chuck feeding units, were also displayed.

METALFINISHING SHOW EXHIBITORS

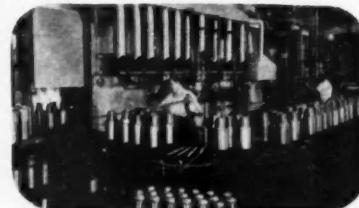
Acme Mfg. Co.
Stephen Bader & Co.
Black & Decker
Buckeye Tool Corp.
Bush Mfg. Co.
Chicago Pneumatic Tool Co.
Chicago Rubber Co.
Curtin-Hebert Co.
Curtis Machine Co.
Delta Mfg. Div.
Divine Bros. Co.
Engelberg-Muller Co.
Fenlind Engineering Co.
Formax Mfg. Corp.
Grinding & Polishing Mchry. Corp.
Hammond Machinery Builders
Jovair Mfg. Co.
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Porter-Cable Machinery Co.
Production Machine Co.
Ryman Engineering Co.
Skill Corp.
Sundstrand Machine Tool Co.
Thor Power Tool Co.
Watervliet Tool Co.

Barber-Colman Buys Hendey Machine Co.

Barber-Colman Co. has purchased the Hendey Machine Co., Torrington, Conn., except for its manufacturing facilities. It will henceforth be known as the Hendey Machine Division of Barber-Colman Co. The Hendey Machine Division will manufacture the complete line of Hendey tool room and manufacturing lathes and Hendey shapers. Manufacturing operations will begin at the Barber-Colman plant in Rockford, Ill., within the next two or three months. Parts, sales and service will be available temporarily through either the Barber-Colman sales organization or the present Hendey sales representatives.



EF CHAIN BELT CONVEYOR FURNACES. Unsurpassed for uniform, low cost, scale-free hardening. 11 sizes. Capacities 175 to 2000 lbs. per hour. Built by The Electric Furnace Co., Salem, Ohio.



EF GAS CARBURIZING FURNACE. Handles several different heat treating processes and cycles—efficiently and economically. Built by The Electric Furnace Co., Salem, Ohio.



EF BRAZING FURNACES produce strong steel, aluminum, copper and other ferrous, non-ferrous and bimetal assemblies with maximum material savings and high surface finish. Built by The Electric Furnace Co., Salem, Ohio.



Production HEAT TREATING FURNACES

We build production equipment for heat treating ceramics and metal products in any shape or form.

We build the furnace to fit the job.

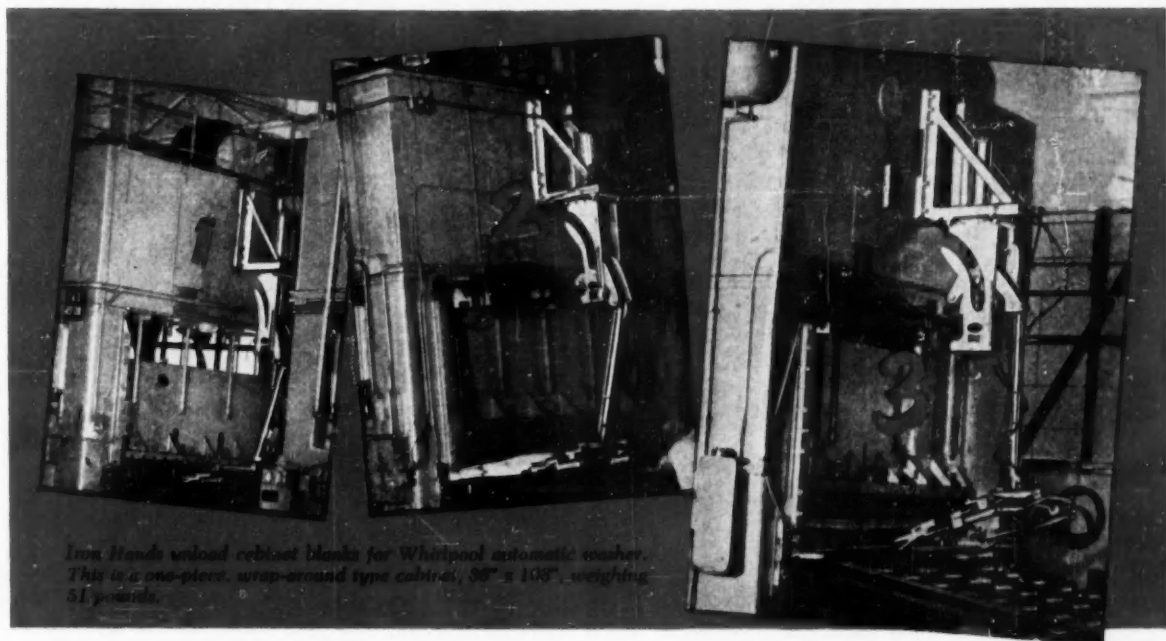
Ask for Bulletin 461-SA

IT SHOWS 18 INSTALLATIONS

THE ELECTRIC FURNACE CO.

Salem - Ohio





Iron Hands unload cabinet blanks for Whirlpool automatic washer. This is a one-piece, wrap-around type cabinet, 36" x 108", weighing 51 pounds.

Whirlpool installs 3 Iron Hands!

Saves \$20,000 annually...reduces accident hazard

Dependable operation of Iron Hands boosts production of automatic washers

Whirlpool Corporation recently installed Sahlin Iron Hands on three presses to automatically unload 51-lb. cabinet blanks for their automatic washers. By using the maximum press capacity for the first time, they obtained immediate increase in production—an increase, which according to Whirlpool officials, results in savings “in excess of \$20,000 annually”.

In addition to dollar savings, manpower requirements were reduced 40%. And the accident hazard was cut proportionately. Moreover, the three Iron Hands have given dependable service since their installation.

But Whirlpool's experience is no different from that of hundreds of others. Now, virtually every

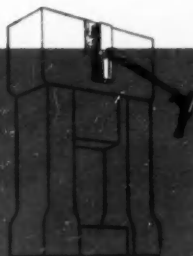
large stamping plant in the world uses these swinging arms to unload all types of press stampings—large and small. And they can be applied with equal efficiency to brakes, shears and forging machinery. The Iron Hand principle has also been adapted to floor-type extractors and to special feeding and unloading machines.

Join industry's swing to automation. Investigate the Sahlin Iron Hand. You'll find it can be equipped with a gripping jaw to handle practically any press stamping. Send for your free catalog today.

SAHLIN ENGINEERING COMPANY

P. O. Box 289, Birmingham, Michigan

Representatives in: Dayton • Toledo • Pittsburgh
Philadelphia • Buffalo • Syracuse • Los Angeles
San Francisco • Seattle • London • Paris • Milan



—to raise pressroom standards

SAHLIN

SWINGING ARMS (4 SIZES)

FLOOR TYPE—FIXED AND ROLL-AWAY MOUNTS • HORIZONTAL DESIGN • UNIQUE GRIPPING JAWS

S. S. KRESGE CO.



**F. P. Williams, President
S. S. Kresge Company**

"The key men and women of our organization

*regularly and thoroughly read Business Publications
...especially articles covering business trends in mer-
chandise and developments in the retail variety field."*

To carry Mr. Williams' thought a step further, men and women who have to keep their thinking a step ahead of their work have one common characteristic. They read thoroughly the publications that give them the most help.

Just as the Kresge executives follow their business publications for trends and developments in the lines of their special interests, so leaders in every field of business and professional activity study each issue of the business periodicals in their own fields.

Such regular and thorough reading is a tribute to the ability of editors and special writers to think in terms of tomorrow. Regular and thorough readership means, too, that the advertising pages of the Business Press form a direct sales channel for products and services that are sold to business and professional men.

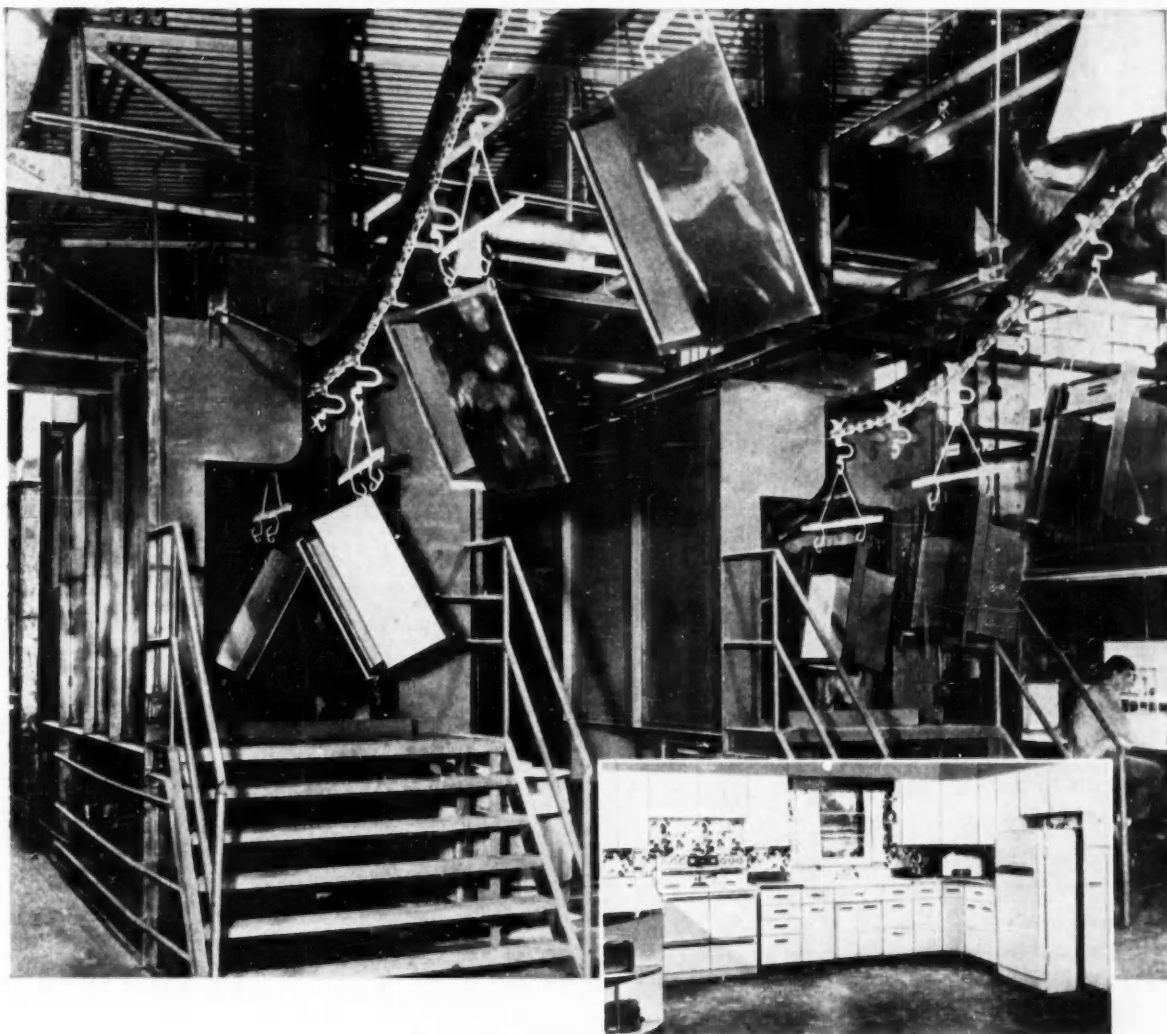


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The national association of publishers of 165 technical, professional, scientific, industrial, merchandising and marketing magazines, having a combined circulation of 3,849,056...audited by either the Audit Bureau of Circulations or Business Publications Audit of Circulation, Inc....serving and promoting the Business Press of America...bringing thousands of pages of special-

ized know-how and advertising to the men who make decisions in the businesses, industries, sciences and professions...pin-pointing your audience in the market of your choice. Write for list of NBP publications and the latest "Here's How" booklet, "How We Use the Business Press and Why" by William C. Sproull, Director of Advertising of the Burroughs Corp., Detroit.





How to get a "**Bulldog Grip**" on beauty!

The bright, shiny new paint finish looks wonderful when it comes off the production line. Looks equally fine in the showroom, when the customer makes her choice.

Then it gets out into service, and the real test begins.

Bonderite's "bulldog grip" holds paint finish to metal. In Bonderite installations like the one shown above, the surface of the metal (before painting) is converted

chemically to a nonmetallic coating integral with the metal which resists corrosion, confines damage from scratches to the site of the injury itself. It's satisfaction insurance, used today on leading painted products of all types where lasting fine appearance is important.

If you aren't now using Bonderite on your painted metal products, better check up and learn how economically you can have its advantages. Call or write today!

*Bonderite, Bonderlube, Parco, Parco Lubrite—Reg. U. S. Pat. Off.

Since 1915—Leader in the Field



PARKER RUST PROOF COMPANY

2178 E. Milwaukee, Detroit 11, Michigan

BONDERITE
corrosion resistant
paint base

BONDERITE and BONDERLUBE
aids in cold forming
of metals

PARCO COMPOUND
rust resistant

PARCO LUBRITE
wear resistant for friction
surfaces

TROPICAL
heavy duty maintenance
paints since 1883

WHAT'S THE BEST
WAY TO STRIP
METAL PARTS
IN LARGE VOLUME?

See page 9



Are you looking for better methods for stripping paint?

Do some finishes resist your present stripping methods? Do rejects pile up and cause a bottleneck in your production line? Do you have trouble stripping vertical surfaces of large products?

Oakite's FREE booklet on "How to STRIP PAINT" will help you find more efficient procedures. You'll want to read more about:

- ❑ What's the best way to strip paint from metal parts too large to be soaked in tanks? *See page 3.*
- ❑ What's the best way to strip large areas of structural metal where a steam supply is available? *See page 5.* Where steam is not available? *See page 7.*
- ❑ What are the best ways to prepare stripped metal for repainting? *See page 11.*
- ❑ What strippers are best for removing oil-base paints? . . . Synthetic enamels, alkali-resistant plastics or resin-based paints? . . . Japans, wrinkle finishes, nitrocellulose lacquers, alkyds, phenolics and ureas? *See page 12.*

FREE For your
copy of
"How to STRIP PAINT"
just write or mail the
coupon.

Technical Service Representatives in
Principal Cities of U.S. and Canada



OAKITE PRODUCTS, INC.
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Send me a FREE copy of "How to STRIP PAINT"

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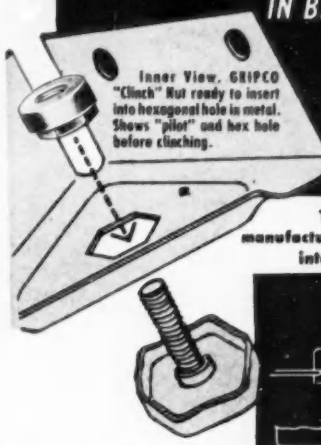
Company _____

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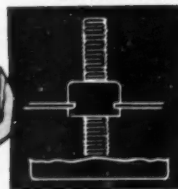
FOR LOWER COST "FIXED" FASTENINGS
IN BLIND ASSEMBLIES

GRIPCO

"CLINCH" NUTS



This is how leading appliance
manufacturers get lower cost fasteners
into inaccessible places.



← Cross-Section
view after pilot has
been clinched and
bolt inserted. Can
be locked at any
point. (Non-locking
nut can be supplied
if preferred.)

For "hard to reach" places a Gripco "Clinch" nut holds tighter, wears longer, reduces mechanical failure for greater customer satisfaction. Provides added threading depth for applying bolts to thin metals. Holds product rigid in its container during shipment and holds the adjustable "levelers" tight for product installation and use. Used by leading appliance manufacturers.

GRIP NUT COMPANY

"After 50 years—still holding strong"

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SAMPLES AND
FULL DETAILS

AUTOMOTIVE INDUSTRIES

is read by general executives,
production men, engineers, pur-
chasing agents and others whose
o.k. means orders for those
who sell to the World's Largest
Manufacturing Industry.



"Financial Security Is Based On Savings..."

ARTHUR B. HOMER

*President
Bethlehem Steel Corporation*



"... and the purchase of U.S. Savings Bonds through the Payroll Savings Plan is one of the easiest ways for any individual to save for economic security."

If you agree with Mr. Homer that "... the Payroll Savings Plan is one of the easiest ways to save for economic security,"—

If you believe with millions of other Americans that there is no safer investment than U.S. Savings Bonds—

Why not take a *really personal* interest in your employees and your Payroll Savings Plan?

Pick up the phone, now, and ask the man in charge of your Payroll Savings Plan three questions:

- How many of your employees are enrolled in the Payroll Savings Plan?
- What is the percentage of employee participation?

- When did your company last conduct a person-to-person canvass?

If less than 50% of your employees are enrolled in the Plan ... if you have not conducted a person-to-person canvass in the past two years (*or if you do not have the Plan*), act now! Telephone, wire or write to Savings Bonds Division, U.S. Treasury Department, Washington, D. C. You will hear promptly from your State Director, U.S. Treasury Department who will be glad to help you conduct a person-to-person canvass that will put an application blank in the hands of every employee. That is all you have to do. Your employees will do the rest. They want to save for their economic security.

The United States Government does not pay for this advertising. The Treasury Department thanks, for their patriotic donation, the Advertising Council and

AUTOMOTIVE INDUSTRIES





HOW R/M ENGINEERING SETS



Pictured above are a few of the many friction material parts made and bonded by Raybestos-Manhattan—brake linings, clutch facings, and automatic transmission bands and plates. The latter present a particularly good example of the need for bonding. Only .015" thick, with grooves .007" deep, they do not permit riveting.

THE RECORD OF "FIRSTS" IN FRICTION MATERIAL DEVELOPMENT

SHOWS WHY R/M IS FIRST IN FRICTION

FIRST Woven Brake Lining • FIRST Asbestos Brake Lining • FIRST Ground Wearing Surface • FIRST Zinc Alloy Wire Brake Lining • FIRST Pre-Treated Yarns • FIRST Extruded Pulp Brake Lining • FIRST Flexible Pulp Brake Lining in Rolls • FIRST Dry Process Brake Lining • FIRST Semi-Metallic Brake Lining • FIRST Bonded-to-Metal Brake Lining • FIRST Woven Clutch Facings • FIRST Molded Asbestos Clutch Facings for Clutches Operating in Oil • FIRST Endless Woven Clutch Facings • FIRST Pre-Treated Clutch Facings • FIRST Bonded-to-Metal Clutch Facings

THE PACE IN FRICTION MATERIAL DEVELOPMENT

BONDING

The bonding of friction materials to other mating members is an art. Raybestos-Manhattan, for fifty years the world's largest maker of friction materials, has spent a longer time than any other company acquiring proficiency in it. Each successive job we've tackled has added to our knowledge of friction materials behavior, metals handling, heating cycles, adhesive selection, and the like. Consequently, we offer you bonding know-how and experience second to none.

Trouble-shooting field trips—hundreds and hundreds of them—have familiarized R/M engineers with countless bonding problems. So the chances are that if one is confronting you, R/M has already solved it. Example: a manufacturer could not bond R/M-furnished, semi-metallic strips to his automatic transmission bands without developing blisters. R/M engineers found that gas generated by the adhesive was causing the trouble. Our engineers recognized the condition as one they had encountered in bonding other materials. By installing a breather—a momentary release of pressure in the bonding cycle—they eliminated the problem.

R/M can bond to almost any type material. Steel is the mating member most frequently used. But R/M can also bond to aluminum, phosphor bronze, and fibrous materials.

R/M is at home in both the asbestos and metal fields, working with all friction materials. You are assured of unbiased advice on these materials when you consult an R/M engineer. Our contributions to today's automatic transmissions prove the point. Every model of full or semi-automatic transmission for passenger cars (many trucks, too) is equipped with one or more R/M friction products—sintered metal, semi-metallic, woven, molded, or cork-cellulose.

If you are working with friction materials, we suggest that you call in an R/M representative. It will pay you to take full advantage of our experience and the facilities of our seven plants, with their research and testing laboratories.

Write for your free copy of R/M Bulletin No. 500. Its 44 pages are loaded with practical design and engineering data on all of R/M's friction materials.



**R
M**
FIRST IN FRICTION

THE TRADE-MARK
THAT SPELS
PROGRESS IN
FRICTION MATERIAL
DEVELOPMENT

RAYBESTOS-MANHATTAN, INC.

EQUIPMENT SALES DIVISION: 6010 Northwest Highway, Chicago 31, Ill. • Detroit 2 • Cleveland 14 • Los Angeles 58
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Canadian Raybestos Co. Ltd., Peterborough, Ontario, Canada

RAYBESTOS-MANHATTAN, INC., Brake Linings • Brake Blocks • Clutch Facings • Fan Belts • Radiator Hose • Industrial Rubber, Engineered Plastic, & Sintered Metal Products • Rubber Covered Equipment • Asbestos Textiles • Packings • Abrasive & Diamond Wheels • Bowling Balls

for want
of a
HUGLOCK Nut
an entire assembly
may be lost . . .



**"Use wrench and
screwdriver fre-
quently to keep bolts
tight" . . .**

. . . says Business Week's editor of Personal Business page in a recent issue concerning precautions to be taken in the care of vital household equipment . . . he goes further to say "this insures against strain, breakage of parts, excessive wear." . . . Specify HUGLOCK self-locking nuts in the design of the original equipment and avoid all such waste. . . . The tapered top portion of the nut is slotted to form six threaded segments. These are curved radially inwards to press against the bolt. This creates a heavy inward and downward pressure, producing a friction lock, between the load carrying flanks of the nut and the bolt threads. The combined metal to metal hugging and locking friction is distributed over all of the threads, enabling HUGLOCK to grip the bolt firmly, until removed by a wrench. . . . The HUGLOCK section of our new catalog which is on the press, contains 24 pages. It includes complete information, specifications, engineering data, and prices. It will be furnished upon request. . . . Complete catalog of products may also be supplied if you so indicate. . . .

**NATIONAL
MACHINE
PRODUCTS
C O M P A N Y**

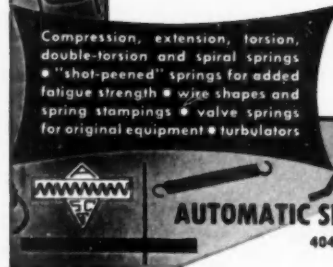
*Manufacturer of Standard
and Special *12 Pointer and
Hexagon Nuts . . . "Huglock"
and "Marsden" locknuts.*

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**Call in a Spring Specialist
WHILE YOU DESIGN
to save TIME • COSTS • FAILURES**

While your product is in the design stage, we can make available to you our 35 years of Spring Engineering and Production Experience — a safeguard for you against production and performance failures. Properly designed and conscientiously manufactured springs will decrease your production costs, raise the efficiency of your product, and increase your customer satisfaction. We have the ability and organization to deliver such quality precision mechanical springs. Call or write us for any spring requirement.

Compression, extension, torsion, double-torsion and spiral springs • "shot-peened" springs for added fatigue strength • wire shapes and spring stampings • valve springs for original equipment • turbulators



AUTOMATIC SPRING COILING CO.

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Chicago 30, Illinois

THE CLAMP CENTRAL THE CLAMP
HOUSE HOUSE

Manufacturers of a Full Line of Hose Clamps

- 1—"ALLSIZE"—100% UNIVERSAL—BAND CLAMP—FITS ANY SIZE HOSE— $\frac{1}{2}$ " I.D. AND UP.
- 2—"360" NEW, POWERFUL DOUBLE STRAND WIRE HOSE CLAMP—WITH THE "PUSH-PULL" ACTION.
- 3—"WORM-GEAR"—THE BEST GEARED CLAMP MADE—PROVIDES GREAT POWER AND EXTRA TAKEUP.
- 4—"TWO-PIECE"—EXTRA STRONG—INEXPENSIVE—BAND TYPE—VIBRATION PROOF HOSE CLAMP.

Tell Us Your Clamp Problems! We Will Send Samples, Without Charge, of the Type and Size Hose Clamp You Need.

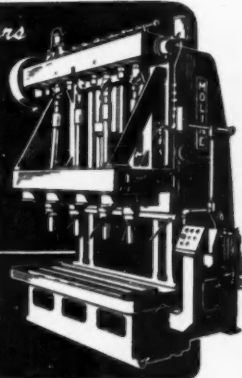
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CENTRAL EQUIPMENT CO., 1112 So. Wabash Ave., Chicago 5

MOLINE For Over 50 Years
"HOLE-HOG"
Specially
Designed
MACHINE TOOLS
Have Cut Production Costs
for American Industry



No. HUS8—Hydraulic
rail feed universal joint
type multiple spindle
drilling machine.



Here's the Fastest, Most Efficient Cold Draw Processing Line Available

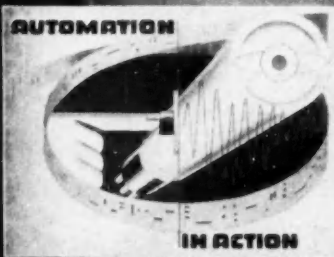
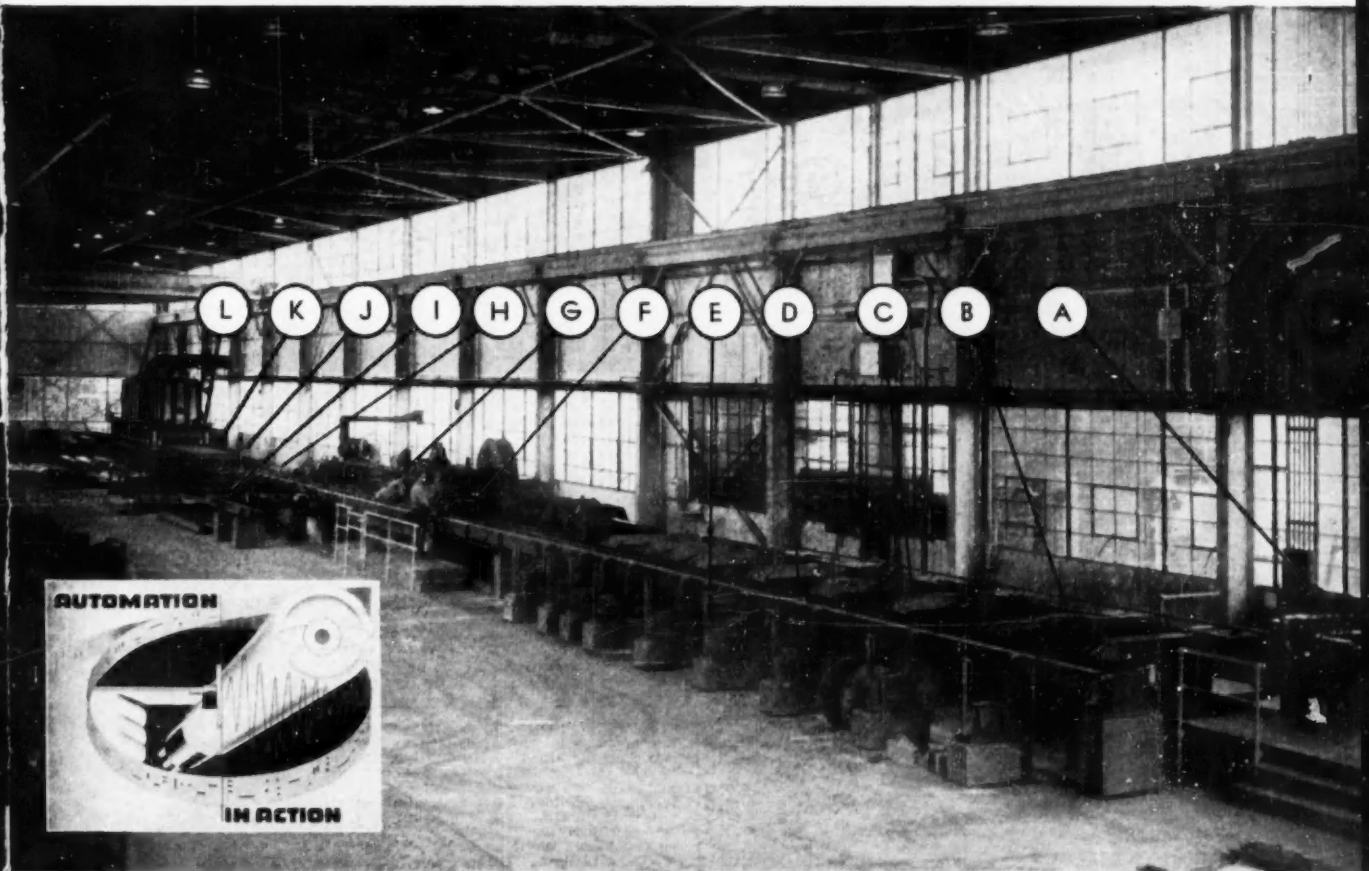
The McKay Automated Line that automatically handles and processes hot rolled bars through cold drawing, shearing and straightening in a continuous cycle has proved itself to be far and away the fastest, most efficient cold draw processing operation in action today. Users are finding they can effect great labor savings while actually boosting production, and at the same time get a more uniform product.

Hot rolled, pickled bars are push pointed, drawn, sheared to length, and straightened in a single, continuous operation with no intermediate handling of any type. Hold down and crop gauging on a multiple shear, plus automatic length gauging, permits the shearing operation to keep

pace with the maximum drawing cycle. Sheared bars are automatically entered into the straightener which operates at speeds high enough to enable a continuous straight-line flow of bars.

Does the line pay off? Three of four companies now using these lines say they have already paid for themselves and are contemplating the purchase of additional units.

CAN YOU AFFORD TO OPERATE WITHOUT SUCH COST SAVING EQUIPMENT? Remember handling adds nothing to the value of your product. Why not look over the McKay line of automated processing-handling equipment? Why not talk it over with a McKay engineer? There's no obligation.



A—Hydraulic Push Pointer Eliminates pointing prior to drawing. Minimizes point scrap.

B—Multiple Bar Draw Bench One, two or three bars at a time.

C—Horizontal Pneumatic Transfer Arms Takes drawn bars from bench and deposits them on driven shear entry table.

D—Shear Entry Table Conveys drawn bars to the shear.

E—Auxiliary Racks

F—Multiple Bar Shear Has capacity to shear same number and sizes of bars that are drawn.

G—Cut-to-Length Gauge Table Automatic cut-to-length and crop gauges.

H—Shear Run-out Table Driven table conveys sheared bars to straightener entry table.

I—Transfer Skids Entry to straightener table.

J—Automatic Straightener Entry Table Completely automatic feed from transfer skids into straightener.

K—Straightener

L—Straightener Exit Table and Racks

The M^cKAY MACHINE Company
YOUNGSTOWN, OHIO



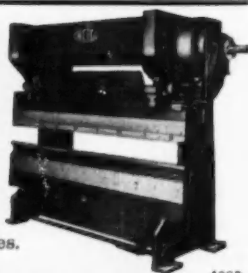
ENGINEERS AND DESIGNERS OF
EQUIPMENT FOR THE AUTOMOTIVE,
FABRICATING AND STEEL INDUSTRIES



STEEL PRESS BRAKES

43 Standard Sizes

DIES Punching and
Forming for All Makes
and Sizes of Press Brakes.



DREIS & KRUMP
MANUFACTURING COMPANY



7420 S. Loomis Blvd., Chicago 36, Illinois



Fellows

MACHINES AND TOOLS FOR
GEAR PRODUCTION

The Fellows Gear Shaper Company, Springfield, Vt.



Wash. 2-4000

New RAILS Relaying—

SPECIAL OFFER

50 NET TON 12# A.S.C.E. NEW RAILS
100 NET TON 25# A.S.C.E. NEW RAILS
500 NET TON 88# A.S.C.E. RELAYERS
COMPLETE COMPLEMENT OF JOINT BARS FOR
EACH SECTION—SEND US YOUR INQUIRIES

Steel Supply Co.

4201 W. FORDING AVE. • P.O. BOX 189 • DEARBORN, MICH.

DoALL Granite SURFACE PLATES

Non-Rusting • Non-Magnetic • Utmost
Accuracy • Cheaper Than Metal Plates

- Wear Free
- Shock Proof
- Harder than
hardened steel
- Velvet Smooth
- Unsurpassed for
Production,
Inspection
and
Layout Work



SIZES SHAPES AND
ACCURACIES FOR
EVERY REQUIREMENT

Consult your yellow
Directory for location of
nearest of the thirty-eight
DoALL Sales-Service Stores
that stock complete metal
working necessities.



Call Your DoALL Service-Store



Machine Tools



Cutting Tools



Measuring Instruments

Shop Supplies

In Stock

The DoALL Company, Des Plaines, Ill.

DYKEM STEEL BLUE

Stops Losses
making Dies and
Templates



Popular package is
8-oz. can fitted with
Bakelite cap holding
soft-hair brush for ap-
plying right at bench;
metal surface ready for
layout in a few minutes.
The dark blue background
makes the scribed lines
show up in sharp relief,
prevents metal glare. In-
creases efficiency and
accuracy.



With DYKEM Steel Blue

Without DYKEM Steel Blue

Write for sample
on company letterhead

THE DYKEM COMPANY
2301L North 11th St. • St. Louis 6, Mo.



CUT SCRAPER TIME

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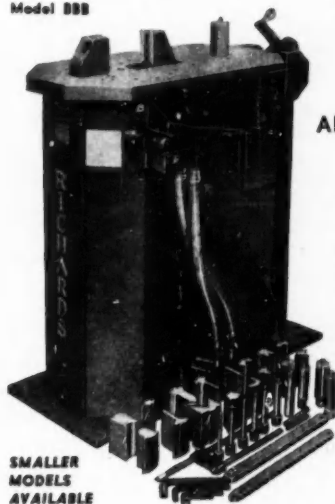
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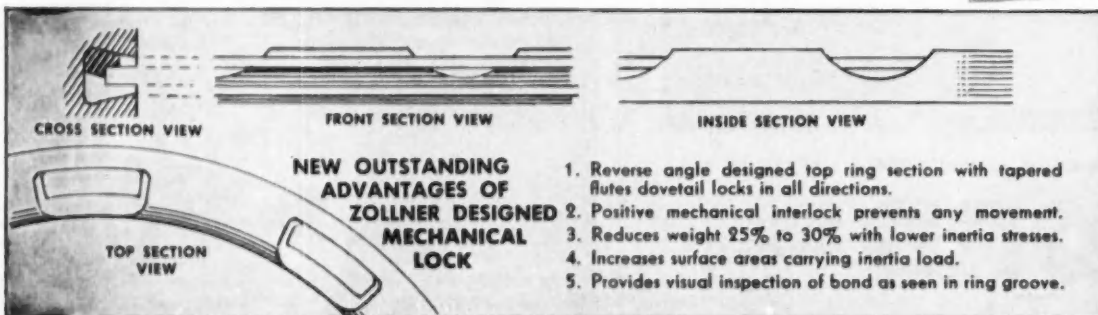
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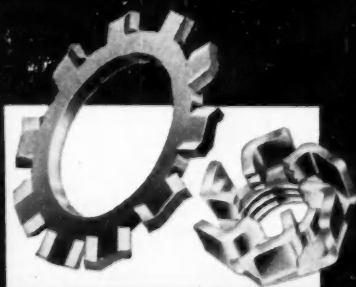
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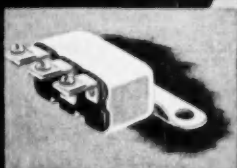
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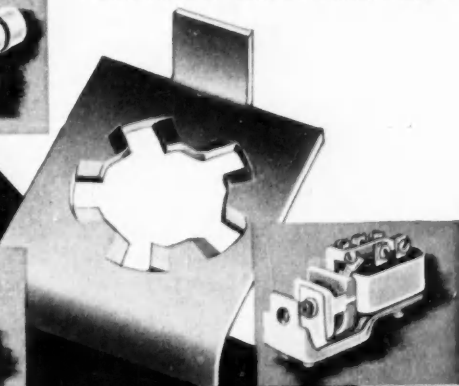


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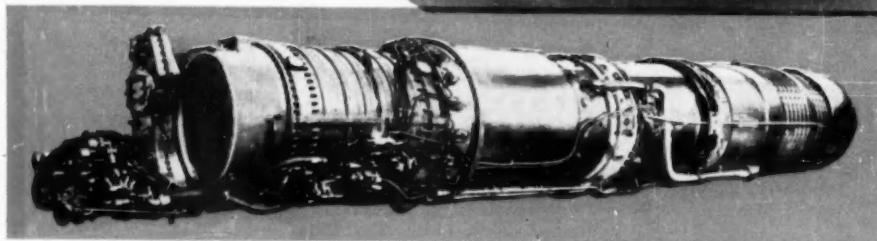


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